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JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION

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THE STATISTICAL EQUIVALENT OF GOLD*

By W. Randolph Burgess
Federal Reserve Bank of New York

In the relation between gold and monetary policy there exists at the moment a curious paradox. For four years the United States has bought gold at one fixed price and when the movement of funds was outward has sold gold at a fixed price. The fixed buying and selling prices have maintained the international value of the dollar. In that respect we have followed the operating practice of the gold standard more nearly than almost any other country. At the same time our domestic monetary policy is less influenced by gold than that of most other countries, and less influenced by gold than ever before in our own history. Quite aside from changes in monetary laws our gold holdings have been so huge that domestic monetary policy is largely independent of gold.

In a relatively short time, as human institutions develop, we have gone from a largely automatic currency system based on gold to what is in large measure a managed currency. We have not done this all in one leap, or by accident, or in the main as a part of the New Deal. The longest step was taken twenty-three years ago when the Federal Reserve System was established. It was indeed a longer step than was generally recognized at the time. Little was said about credit control in the discussions of the bill, nor did the Act itself define objectives for policy, except to say that discount rates should be fixed "with a view of accommodating commerce and business." This phrase, and others in the Act, suggest a mechanism for supplying business with a little extra money now and then for seasonal or emergency needs rather than the continuing control of credit. Nevertheless the framework of the System with few changes was adequate for a much larger function. The war gave the first impetus for expansion of both objectives and operations. War was also responsible for a reversal of this country's international position and a huge inflow of gold, again providing both the incentive and the material for a further growth of function. The depression, another vast increase in the gold supply, and a change in the

* Presidential address at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, December 28, 1937.

nation's political-economic philosophy have moved us further in the direction of monetary management. We have come a long distance and find ourselves in a country far from the point where we started.

We may well ask ourselves how we may find our way about in this new country. Where do the different roads lead and what do the signposts in these strange new languages, such as are invented by Mr. Keynes, mean. It was, at least in theory, simple enough in the old days. The gold supply operated directly on the money supply. It was the business of the central bank, where there was one, to protect the gold reserves. This guide to policy was sometimes blind and arbitrary, but it was definite and convincing. In the present strange new world, where the old gold portents have lost their former meaning, where is the radio beam which the central banker and others may follow? What is the statistical equivalent of gold?

The change from a semi-automatic gold standard to a far more flexible currency system, more subject to management, has I believe greatly increased the opportunities and responsibilities of the professions represented in this meeting. If the money mechanism were more automatic, or could be operated by rules and traditions alone, the responsibility for its operation could conceivably be left without much concern solely to a group of technically trained specialists. But when the bank of issue is facing such new problems in such a new situation, its success will depend in some considerable measure on the capacity of our two professions for applying to these problems the techniques of economic and statistical analysis, not alone for the benefit of the officers of the central bank, but for the guidance of political and public opinion.

I am tempted to suggest that in some degree our two professions have brought this problem on themselves, for the wider and more general responsibilities of the Federal Reserve System, and of other central banks as well, are due not solely to the force of circumstances, but also to the trend of economic thought, which has favored more and more management. It is therefore only fair that we should aid the central bank in its search for the statistical equivalent of gold.

There is gradually growing up a literature on this subject, most of it very recent, and most of it too general in its terms to be of much immediate use to the central bank. Some of it is badly in need of the services of a sound statistical practitioner. Even on basic principles there is far from general agreement. As to experience there are only a few years during which banks of issue have had anything approaching the present freedom of action, and these years have been so abnormal in their political and economic setting that results are hard to evaluate.

In the interest of a proper humility it should perhaps be added that the greater freedom for management of money has not thus far yielded greater economic stability. The years of increased management have witnessed the widest business fluctuations for which we have records. But the times have of course been abnormal. Powerful non-monetary forces, including the sequelae of war, have been disrupting. The lessons of this experience are far from clear.

I have no intention this evening of attempting to set forth an original solution of these problems, but what I propose to do is to outline more specifically some of the sorts of problems involved in finding a sound basis for central bank policy.

It is perhaps natural that the first object of search should be some single index which would be as simple and convincing as the gold ratio. Such an index would be a great comfort. It is fitting that we should pay our respects to several indexes which have been suggested to fill this important role.

Commodity Prices. Among possible guides to credit policy commodity prices should always be mentioned first, not alone because of their importance but also to avoid giving offense. For in this context commodity prices are the object of a form of religion, and price stabilizers have all the fervor of the most evangelical sect. Seek this first "and all these things shall be added unto you." Few feel so strongly about production, employment, or other possible guides to policy. Prices are certainly some measure of the kind of changes in the economic structure for which the central bank must be on the alert. They usually are sensitive to overexpansion or to incipient depression. But they and their interpreters are, alas, frequently misleading and confusing guides.

In the Macmillan report, for example, the stability of international prices is repeatedly emphasized as the main objective of monetary policy, but there is the qualification that before they are stabilized prices should first be put up a little,—just how much the report does not say. This report was slightly aggrieved because during the period of the 20's the United States was not letting gold imports cause an upward movement of prices. On the other hand Professor Phillips and his associates in their recent book[1] tell us that a policy of price stability was all wrong in this country in the twenties, because the normal trend of prices was downward. In 1928 the signs were certainly confusing, for commodity prices were level or declining at a time when most of the other signs showed the need for a policy of restraint.

[1] C. A. Phillips and Others, *Banking and the Business Cycle* (New York: The Macmillan Company, 1937).

There are other difficulties as well. How about the situation today? In relation to the debt structure, prices probably ought to be higher than they are now, but how high, and how fast should the movement be? One trouble with price stability as an aim is that you have to start somewhere, and nobody knows quite where.

May I suggest also that if a price index is to be compared with the changes in bank credit it must be broader than commodity prices alone. I suspect that wage rates and rents and the cost of living are just as important, and even, we are now willing to admit, the prices and yields of securities. More attention may well be given to relationships between the movements of different sorts of prices. But even these broader price studies, helpful as they may be, are not by themselves an adequate guide to policy.

Production and Employment. The time-honored formula recognized by the Reserve Board in its 1923 Annual Report was to the effect that danger signals were run up whenever production was operating to capacity and there was full employment. Beyond that point supplies of credit were likely to result in competitive bidding for products. The formula still commends itself. It was especially applicable to the situation at the beginning of 1923. But it was not much help in 1928 and 1929 when there was still some leeway in plant capacity and in employment, and yet later events apparently showed that overinvestment had been taking place at least in certain directions.

The movement of the production index alone is moreover an inadequate guide for credit policy for intermediate movements, like that of late 1936 and early 1937, when the rate of increase proved to be more rapid than could be sustained although operations generally were far short of capacity. Of course, also, the mere fact of large and continued production of capital goods should not of itself be an indication of the need for restraint. There is no inherent reason known to us why the rate of growth of the standard of living, or per capita production, in this country should not be more rapid than, let us say, the two per cent per annum rate to which we have become accustomed.

The production index therefore is not the magic figure we are seeking as a guide to policy. Recent efforts towards breaking down this index into significant parts which might show the extent of capital investment as distinguished from production of non-durable goods have not yet gone far enough to justify conclusions as to their utility for the central banker, but they give promise of revealing some further knowledge of the nature of business fluctuations.

Volume of Bank Credit. Another index which over a period of years has established some claim to consideration as a guide to policy has

been the rate of growth of bank credit. The studies of Carl Snyder have shown that when the growth of credit has departed from the usual long term rate of growth of the country's business, it has been an influence towards instability. But like every other index this one has gone bad from time to time. In 1928, for example, bank credit stopped increasing, but the increase in velocity, partly stimulated by lending of other agencies (security loans "for account of others"), more than made up. As in the case of prices a rule of reason is required in the interpretation. In addition to changes in velocity the rate of recently preceding growth or decline must be considered. For example, after the violent decline in the volume of credit at the time of the banking holiday a more than normal increase was a healthy expectancy, and after the very rapid increases of 1933 to 1936, largely due to government deficit financing, some pause in the rate of growth seemed reasonable and likely to be compensated by some increase from a very low velocity. Just as in the case of prices some assumption must be made as to the starting point before the formula will operate. So even this valuable index may not be accepted as the sole guide.

One might extend considerably this list of pretenders to the throne of gold, but in each instance we should be likely to discover some flaw in their lineage, some sound reason why they should not be elevated to the crown. Some of them might with reason qualify as members of the privy council, but they do not deserve royal status.

To use still another analogy the search for a single gold equivalent appears in the present state of our knowledge much like the search for the spring of perpetual youth, or for the pot of gold at the end of the rainbow.

This disqualification of a sole guide to policy becomes clearer perhaps if we visualize in real rather than abstract terms some of the decisions which must be made by central banks. There is, for example, always the difficulty of maintaining the balance between long term and short term objectives. Let me illustrate. During the period of the twenties the Federal Reserve System made a vigorous attempt to use its powers in the interest of economic stability. It was this country's most conscious attempt up to that time at the management of money for the public good. You will recall particularly the open market purchases of government securities in 1924 and 1927, and the sales in 1925, 1926, and 1928. When business declined, the System made money more freely available, and when it recovered, the System withdrew funds from the market. I quote from Hawtrey, "The American experiment in stabilization from 1922 to 1928 showed that early treatment could check a tendency either to inflation or to depression in a few

months, before any serious damage had been done. . . . The American experiment was a great advance upon the practice of the nineteenth century."[2]

Many others have been kind enough to give the Reserve System credit for successful achievement in that period. But that, alas, is not the whole story. Let me quote from Wesley Mitchell, "For we think that the violence of convulsions such as occurred in 1907–08, 1920–21 and 1929–33 is due largely to the partial character of the liquidations effected during mild contractions, . . . "[3]

This conclusion, based on long study of the behavior of business fluctuations, surely gives one pause. In both 1924 and 1927 the Reserve System recognized the possibility of business depression and took action promptly to cushion the decline. I have no doubt that its action played a part in lessening the severity of those recessions. Is that not proper procedure in monetary management? And yet does not Dr. Mitchell's conclusion lead one to wonder if we should not have fared better with less monetary management? If nature had taken its course and those minor recessions had been permitted to be more severe, they might perhaps have forced some readjustments in the economic mechanism and left less to be done when the big depression came in 1929.

It may be that the business process requires at relatively frequent intervals periods of readjustment, and if these are shortened or avoided, the result in the long run is a more serious readjustment. If that is so, a number of interesting deductions suggest themselves. One is that monetary policy is a long term problem and that the results of any policy may not safely be judged for perhaps a decade. It may be even longer before we may judge, for example, the usefulness of stabilization funds as monetary mechanisms. It may be two or three decades, five or more presidential terms, before we know the results of the devaluation of the American dollar, and the results generally of operating with flexible currencies. Another conclusion is that we are dealing in the business cycle not simply with a wave of psychology or with a short term commercial banking and current inventory fluctuation, but rather with the whole investment cycle.

At least this is clear: that credit control has two aspects, a long term and a short term; and one of the hardest problems of all is to determine the relative weights to attach to each aspect. Apply the question today if you will. The long range problem appears to be the avoidance of inflation. The short term is to get out of depression. How much is it safe to run risks on the first problem in order to deal with the second?

[2] Hawtrey, R. G., *The Art of Central Banking* (1932), p. 300.
[3] *National Bureau of Economic Research Bulletin*, No. 61 (Nov. 9, 1936), p. 2.

We now have one billion dollars of excess reserves. Is that enough to give the proper encouragement to reflation? Is it so much that the underlying inflationary tendencies are unduly encouraged? Is such long continued cheap money sowing the seeds of disequilibrium? The Reserve System would, I am sure, be glad to have our suggestions on this point; now rather than five or ten years hence.

A second puzzling problem which is interwoven with that just discussed concerns the relationship between monetary and non-monetary influences on business fluctuations. Again let me illustrate by a comparison between the depressions of 1920–21 and 1929–33. In the earlier period business and prices reached their high points in the first half of 1920 and declined rapidly in the autumn, so that by December they had made a considerable nose dive. Federal Reserve discount rates which had been raised to 7 per cent in June had not yet been reduced. The records show that in December the question of a lowering of discount rates was carefully reviewed. The conclusion was drawn that, while wholesale prices had declined precipitously, the necessary adjustments had not yet taken place in retail prices and the cost of living, and in industrial costs, and it was therefore unwise as yet to reduce the discount rate. To put the matter in modern language the officers of the System felt there was still disequilibrium in the non-monetary factors and that necessary adjustments would be made more readily and fully with high than with low discount rates. The rate was not changed for several months. Was this wise policy or not? In any event, recovery began in the middle of 1921 and was rapid and continuous.

By contrast what happened in the recent depression? In this presumably more enlightened period the Reserve System was much more prompt and reduced discount rates and bought large amounts of government securities within a few weeks of the onslaught of the depression. Other governmental agencies mobilized for action. Business came to the rescue with large programs of capital outlay. Nevertheless the depression plumbed lower depths than in 1921 and has lasted far longer. Now may we infer that if we had all been less enlightened and had been content to see nature take its course, at least in the earlier stages of the depression, that disequilibria might have been corrected earlier and the depression shortened? Or shall we conclude that monetary policy is impotent in the face of dominant non-monetary influences? The only conclusion which seems wholly safe is that we are painfully ignorant as to the interaction of these great forces.

One way of visualizing certain phases of the relationship between monetary and non-monetary influences is to be found in the distinction between cheap money and easy money. Usually the two go together,

but at the present time their paths have separated. The rates for short money and for prime bonds have been the lowest in the history of the country, and yet because of a feeling of uncertainty as to the future, the position of the borrower is scrutinized with the utmost care, and money is not easy to obtain for any but prime borrowers. It is an illustration of the limitations of the power of the central bank to influence even the effective supply of money. Non-monetary influences are preventing the large volume of funds which are available from flowing into any but restricted channels. Thus while quoted money rates are low, money is not really easy. It is perhaps influences of these sorts which mark the difference between the depression in 1920 and 1921 and that from which we have gradually been emerging.

These two problems of the balance between long term and short term policy and the relationship between monetary and non-monetary influences illustrate the complexities which the central bank here or in any other country faces when it departs from the automatic procedures of the old gold standard and seeks a statistical equivalent. They show, it seems to me, the inadequacy of any single series of figures now available as a guide to policy. They seem to me also to define the scope of the problem. Monetary policy is not something by itself but is simply one phase of a complex flow of economic forces, constantly changing in form and in human consequences. We cannot direct policy wisely until we understand far better than now the stream of economic fluctuations in which that policy plays a part.

I am impressed particularly by how much more needs to be known about the longer term forces which influence business fluctuations. For example, it is often stated that a downturn in business is frequently brought about by increasing costs and declining profits, but there is sorely needed an analysis of the actual changes in business balance sheets and profit and loss statements which mark this turn. Is it perhaps true that the causes of the turn do not show in these statements and that the higher costs which are a deterrent are those which never occur but are anticipated, which prevent plans from passing beyond the blue print stage? Building costs today are perhaps an illustration.

Another direction of study of long term trends which seems likely to be fruitful is a closer analysis of the investment process and the relations within it of monetary and non-monetary influences. The person who borrows funds at long term for investment in enterprise must be convinced of his capacity to make profits over a long period. This involves a prediction as to selling prices, volume of sales, cost of material, wage costs, taxes, and freedom from ruinous competition. The lender of funds must have the money, and must be convinced not

only of the character of the borrower but also of his capacity to earn a profit. The influence of monetary policy on this operation is usually indirect, in maintaining a stable or easy money market, which will encourage investing. It may of course supply funds which banks invest. Perhaps its most valuable contribution is in discouraging periods of excess in which too much bank funds go into investments, tending to produce overinvestment, and in maintaining sound credit conditions as a basis for a sound investment market. Clearly in the whole investment process monetary policy is only one of many factors in producing the result, and its success or failure will be largely conditioned by other factors. This is a process considerably different from the round of short term commercial lending in which the function of the central bank has traditionally been defined. The importance of a better understanding of the investment process is recognized in this program in a series of joint meetings of the Economic and Statistical Associations on the "Influence of Various Factors on Fluctuations of Investment." These meetings move in the direction of supplying the central banking system with the kind of information it needs.

Now if the foregoing analysis is in any way correct, we cannot hope to find a single index which will be the statistical equivalent of gold. Central banks must determine their policies in the light of the whole flow of economic fluctuations and especially the fluctuation of investment. Central banks therefore cannot be run by statistics alone but must rely on the judgment of prudent and informed men. But the judgment of these men will be better as further advance is made in the analysis of all these problems. In this task the Reserve System is in large degree dependent on the professions here represented.

I cannot conclude this paper without mentioning a related central bank problem which is not precisely statistical in nature, but in which the members of these two societies may be of great aid towards the pursuance of sound policy. The bank of issue has two problems: one is knowing what to do; and the other is getting away with it.

The old semi-automatic gold standard had one great advantage not often mentioned: its decisions were accepted as necessities. When the bank rate was raised because of a decline in the gold reserves, the decision was not arbitrary; it might not be liked but it came in the same general class as the rain or the snow from heaven. It was in effect an Act of God. Not only so, but the position of the gold reserve has frequently been a persuasive argument for the balancing of the national budget or other legislation needed at critical times. The decisions of the central bank on broad economic grounds have no such persuasive force.

I am reminded at this point of Henley's poem, a part of which reads:

In the fell clutch of circumstance
I have not winced nor cried aloud;
Beneath the bludgeonings of chance,
My head is bloody but unbowed.

Do you suppose the brave stoicism of this poem is fairly representative of the reaction of human beings who may feel, justly or unjustly, that they have been injured by some act of the central bank which might be regarded as arbitrary in character? Would it be possible for them to say

In the fell clutch of the central bank
I have not winced nor cried aloud;
Beneath the bludgeonings of money management
My head is bloody but unbowed?

We may well recall how the embattled farmer answered this question in 1920. After the so-called deflation policy of the System in 1920, which we would criticize today only for its lateness, the political outburst from agriculture was swift and deadly. In 1929 the memory of the 1920 political reaction was still vivid and probably explains some of the reluctance to take vigorous discount rate action. When action was taken its effectiveness was lessened by the huge gold reserve in the background. High rates were regarded as arbitrary and artificial. Today low rates lose something in effectiveness for the same reason. But the real test comes when the central bank undertakes to tighten money, "arbitrarily."

As long as the bank of issue was charged simply with the duty of protecting the country's gold reserve and so was presumed to be operating in a technical and limited field, it could claim some measure of protection from political pressure. But once the philosophy of monetary management is adopted, and policy decisions become as broad as the general welfare, freedom from political interference becomes a constant battle. The experience of managed currency systems is limited, but no such system has yet demonstrated its power to win that battle.

By the force of circumstance and the force of the stream of economic opinion this country has accepted a large measure of monetary management. As students we have responsibility for developing information and understanding on the basis of which wise decisions may be made. We have also the responsibility of interpreting the functions of the central bank to the people of the country, so that they will preserve its freedom of action. If these tasks are beyond our fulfillment

we should be the first to recommend the abandonment of the general plan and the return to some more automatic system.

In his essay "The Moral Equivalent of War," from which I have purloined my title, William James points out that "war has been the force that can discipline a whole community." If there were no war the problem would be to find other means by which we might "subject ourselves collectively to severities." The gold standard was a mechanism in the financial field by which we might "subject ourselves collectively to severities." Can we and will we do this without the pressure of a limited gold reserve? It is always easy to rationalize the path of least resistance, of indefinite monetary expansion. This way of financial life has many persuasive apostles. Political pressure is always in this direction. The only salvation from this danger lies in an informed public opinion, and the source of such an opinion must be our two professions.

CHANGES IN CAPITAL FINANCING*

By Donald B. Woodward
Moody's Investors Service

An attempt to discuss the capital financing of business immediately meets two major difficulties. The first is the lack of preciseness of the vocabulary, an inexactness so serious as to cause many misunderstandings. The second difficulty is the lack of measurements, either statistical or financial, by which to study the subject.

The difficulty with the vocabulary in which the subject of capital financing of business must be discussed, arises primarily from the fact that the words are taken partly from classical or academic economics and partly from accounting. They are such terms as capital, savings, investment, depreciation, depletion, income, and earnings. In neither economics nor accounting is the meaning of such words exact.

What is the capital of business or a business? Balance sheets give a dollar figure, but what does that mean? It represents plant, equipment, goodwill, patents, working capital and miscellaneous other items valued at a dollar total. This dollar total represents a figure arrived at on the basis of cost perhaps including write-ups, to which various adjustments have been made over a period of time in an attempt to allow for depreciation, depletion, obsolescence, retirements, maintenance, changes in commodity prices, additions to capital and other factors. Have these adjustments been accurate? Who can say? The number of failures, defaults, and forced adjustments that have been necessary over a period of time indicate that they have not been precise.

Perhaps the market value of the assets, in whatever terms defined, might be taken as a standard. But who would buy the total assets of United States Steel, or American Telephone and Telegraph, or Pennsylvania Railroad? Even if there were bidders, what basis would they use to arrive at a price?

Presumably the standard which such hypothetical bidders would use would be the income which the property would or could be expected to produce. Physical property, or patents or goodwill, generally speaking, have no value unless they will produce income. The history of the traction industry, and others, indicates this fact. But what are business earnings?

They are the income remaining after expenses. But expenses include

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association Atlantic City, New Jersey, December 27, 1937.

depreciation, depletion, and maintenance, the inadequacy or excess of which may make true earnings and reported earnings very different figures.

The second difficulty in approaching the subject of business capital financing is that there are very few pertinent or relevant figures for business as a whole, and none which are complete or comprehensive. There are only disjointed fragments, which are often more misleading than informatory. This inadequacy of statistics or measurements, which is a reproach to our profession, seriously limits our knowledge of this most vital matter. When we speak of financing business capital expenditures, we have no figure to measure such expenditures in most lines of business, and no figures which permit an analysis of the sources of funds spent over any period of time. Business expenditures of a capital nature as opposed to those made in operation, are not the amount of durable goods purchased by business, for in such total purchases, even if we knew them, would be included those for maintenance. The amount of capital expenditures is not indicated by changes shown on most balance sheets for plant and other such items, for these are net after many adjustments, and as a result the actual outlays on plant are hidden for the period in balance sheet figures. So far as I know, there are no figures available measuring capital outlays of American corporations, or any group of them which can be related to financial figures over any substantial period of time except some for the railroads which are obtainable with great difficulty. Furthermore the meaning of most figures is limited by the fact that they are available at twelve-month intervals; a year does not, in most businesses, represent the normal operation cycle.

Analysts are accustomed to use some series of figures as representative of such expenditures. The most often used are the totals compiled by the *Commercial and Financial Chronicle* for new issues less refunding. According to the careful studies of Mr. Adam Gostomski of Moody's, however, that series is not at all representative. During no one of the last 15 years can as much as 80 per cent of that total be classed as business financing productive of activity, and in most years the percentage is far less, being as low as 34 per cent in 1929. This is due to the large amount of purely financial issues in the *Chronicle* series. I think that the series developed by Mr. Gostomski is far superior to the more usually used *Chronicle* series, but by no means is it representative of business capital outlays, representing only that portion of funds obtained in the capital market, which clearly is a varying percentage of total outlays.

I suggest that in considering capital expenditures and capital financ-

ing we adopt a strictly financial concept. I believe that this procedure will get us closer to the realities both of financing and of business developments. Let us try to get a concept of where cash comes from and where it goes.

Cash comes to the corporate treasury from a variety of sources: sales of merchandise and services, sales of securities, sales of assets, short term borrowing, etc. Cash goes out of the corporation treasury for the purchase of labor, materials, services, for the payment of dividends and interest, retirement of securities, etc.,—in short, for a variety of types of expenditure.

I suggest that we consider capital expenditures those expenditures which result in additions to assets or are designed to preserve, aside from the ordinary operating expense of maintenance, the condition of the plant. These would include expenditures made in replacement of assets on account of depreciation and depletion.

The physical goods required for additions to and in preservation of assets by business is one measure of gross capital formation by business. And if we reduce this by the depreciation and depletion actually incurred, the residual total may be termed net capital formation by business in the physical sense. I believe that such a definition roughly agrees with those which Dr. Simon Kuznets uses in his most excellent studies, though not precisely. The capital financing of business therefore is the financing of gross capital formation by business.

With such a definition of what is meant by the capital financing of business, the sources of cash which cover these outlays can be seen with some clarity. They are first, net sales of securities and, second, working capital, consisting of a number of fluctuating items and reflecting earnings retention and depreciation policy. Cash may be obtained from working capital by the conversion of short term assets or by expansion of short term borrowing.

These are the chief and preponderant sources in terms of corporate finance. Underlying these and bearing on all of them, however, is the total supply of money in the country and the activity of that money. In the past, except during the World War, both supply and activity were closely related to changes in long and short "payables" of business. During recent years this has not been true, since an extra business agent has been in operation—the Government. Therefore, as an underlying source from which cash has come, through gross income of business, the Government's influence on the total supply of money must be kept in mind. The Government's borrowing from the banks has resulted in an expansion of the supply of money, the expenditure of which has put a considerable amount of cash into corporate treasuries.

If the corporations had borrowed directly, they would have had to pay interest; as it is they must pay taxes. The cash came to them just as if they had borrowed, but through a different channel; they will have to pay current charges and provide for retirement, but by a different process.

The figures available to measure these points and to permit conclusions as to the trend, if any, are fragmentary and incomplete as I have warned you. But in combination they appear to be sufficient, to permit some tentative conclusions, which, if proved true by later investigation, are very significant.

Let us look first at the recent recovery period, 1933 to mid-1937. The outstanding fact of that period was that the country experienced an upward movement of capital expenditures by most lines of business of almost unparalleled rapidity. But the capital markets financed that recovery only to a negligible extent, the new issue market, aside from refunding operations, being most noteworthy by its absence. It is clear, therefore, that the cash which paid for these expenditures came from other sources than net sales of securities.

The actual source has been working capital, which had been built up in the past partly from retained earnings, partly from the fact that amounts reserved for depreciation and depletion had been greater than capital expenditures, and partly from other operations. Working capital was large when the recovery began, and could be drawn down. And earnings, which were being realized after a long dearth, were in substantial part retained in the early part of the recovery.

Beneath these, government deficit financing from the banks was adding rapidly to the supply of money, the expenditure of which by the recipients put cash into corporate treasuries through their sales of goods and services. And the large government budget contributed to the activation of the supply of money which worked toward the same end. To some extent, this government spending and deficit financing made it possible for corporations to have earnings—certainly larger earnings than they otherwise would have had.

In order to describe more precisely what happened, I shall draw on three sources of figures, all thus far unpublished, though I trust that all will presently become generally available. These are studies by Dr. Alexander Sachs of the Lehman Corporation,[1] by a W.P.A. research project in New York sponsored by the S.E.C., and a study by Moody's. The study by Dr. Sachs has, for the first time, analyzed the sources of funds for business capital expenditures, and their uses, for a number

[1] Dr. Sachs' study has since been published in summary in *The Annalist*, Jan. 14, 1938, and in a bulletin of the American Management Association.

of representative corporations, and is the first complete study of which I know. The S.E.C.—W.P.A. project is tabulating the reports of corporations filed under the Securities Act of 1933 and the Securities and Exchange Act of 1934, the excellent forms for which require the disclosure of sufficient information to make possible a picture of the method by which business operations are financed; as time passes, if these forms are kept in effect as I fervently hope, we will eventually have adequate figures over a sufficient period of time to be able to understand better the process of business finance.

In 1933 and 1934, Dr. Sachs' study shows that the corporations' capital expenditures were much less than they reserved for depreciation, they had income deficits, were repaying obligations to banks and the capital market net, while cash declined, inventories and receivables, and current liabilities rose. In 1935 gross plant additions and depreciation charges were about equal, obligations to banks and the capital market were still being repaid, there were substantial retained earnings, and working capital diminished. In 1936 gross plant additions substantially exceeded the amount reserved for depreciation, undistributed profits fell and working capital fell. In short, working capital provided the preponderant portion of the funds which business required during the period, and for the four years there was a substantial net repayment to the banks and the capital markets combined.

The research project figures have not been completed to such a point, but they show, for a representative number of steel companies that while balance sheet items of fixed assets declined in both 1934 and 1935, there were nevertheless substantial expenditures for additions to assets each year.

To approach the subject statistically from a different angle, Moody's studies show that a series made up of the total of retained earnings of corporations, new issues, mortgage financing and a portion of government deficit financing after excluding government spending for purposes clearly not productive of business activity, such as the placing of preferred capital in banks, moves very similarly to an index of investment goods activity. If a satisfactory method were found to add in expenditures from working capital I am satisfied that the similarity of movement would be even closer.

Time does not permit me to present all of the figures of these various calculations. In general terms, however, I can sketch what rather clearly has happened in the course of the past five years to business capital financing.

In 1933 and 1934 business as a whole held its own and probably accumulated some funds. In 1935 and 1936 and early 1937 capital

outlays rose sharply, taking from working capital all of the amounts reserved for depreciation, and causing working capital to diminish sizably. Funds from the capital markets were inaccessible or unnecessary in any consequential amount. The diminution of working capital finally in 1936 sent the corporations to the banks for considerable amounts, particularly as the tax on undistributed profits became operative. Studies by Dr. Willard Thorp at Dun and Bradstreet show that this tax had marked effect on dividend policies. The rising demand for loans on the banks together with the Federal Reserve action in raising reserve requirements caused heavy bank selling of bonds in 1937 preventing a new issue market just at the time when business needed such a market most. At the same time government financing in the capital market ceased, and public debt was demonetized in large amounts, shrinking the supply of cash.

Experiencing a working capital and cash position which was the poorest in more than a decade[2] and going lower, unable to replenish it in the capital markets, and being pressed against retaining earnings by the undistributed profits tax, business capital expenditures declined violently. Such expenditures can't be made when there is no cash, or, more literally, when cash and the current ratio are already uncomfortably low. This situation is sufficient to explain a decline of importance in business. There were other good reasons why business fell sharply this year as well, but financial developments were certainly a vital part of the cause.

Financing of business capital expenditures during the prosperous period of the preceding decade was somewhat different. The excellent figures provided by Dr. Simon Kuznets on the physical flow of durable goods for business use show that about one-half was to replace those losses arising from depreciation and depletion. There are as yet no financial figures paralleling Dr. Kuznets' compilations—that is one of the most important jobs to be done—but some fragments indicate the situation. Dr. Kuznets shows that the production of producers' durable goods, repairs and services to these, and business building construction totaled roughly $12 billions in 1927 and 1928, and $13 billions in 1929. Figures from *Statistics of Income* covering corporations reporting for tax purposes and therefore far less inclusive than the Kuznets' totals, show the amount reserved for depreciation and depletion at about $4 billions each year, retained earnings of $1.1 billions in 1927

[2] Moody's tabulations for 316 industrial corporations show the ratio of current assets to current liabilities, end of year:

1926—4.67	1929—4.87	1932—6.41	1935—4.80
1927—5.17	1930—5.63	1933—5.76	1936—4.27
1928—4.76	1931—6.39	1934—5.23	

and about $2.5 billions in 1928 and 1929. New productive issues are shown by Mr. Gostomski's studies to have totaled about $3 billions each year. Working capital rose slightly each year. These totals account for two-thirds to three-fourths of the totals Dr. Kuznets shows, and indicate a much more important contribution by the capital markets during that period than the recent one.

The railroads provide a case study of 1927–29. The gross capital expenditures of the railroads totaled $771 millions in 1927, $676 millions in 1928 and $853 millions in 1929. Net proceeds from sales of securities less retirements provided about 25 per cent of this amount. In other respects the rails are hardly typical, however, in that they depreciate only equipment, but not, practically speaking, way and structures.

Still other pieces of evidence could be presented. But all the evidence is piecemeal. The job of measuring the process of financing the capital expenditures of business comprehensively and over a period of time is yet to be done. But even the piecemeal evidence appears to warrant definite, if only tentative, conclusions.

Working capital, which had reached a high level as a result of operations in earlier years, provided the major part of cash for the recovery in business capital expenditures from 1933 to mid-1937. In the 1920's the capital market was a much more important source. During 1933–37 the expansion in the supply of money was brought about chiefly by government financing. whereas in the 1920's it resulted chiefly from business borrowing. Very briefly and roughly stated these are the changes in the capital financing of business.

There can be little question that the method of financing in the recent years was economically and financially unsatisfactory, that the change was an unfavorable one. Furthermore, and this is significant, I think that we can agree that the method recently used will not be repeated. With working capital already depleted, drafts upon it to finance another sizable expansion in capital expenditures cannot occur. Nor can working capital be rapidly replenished by earnings retention with the undistributed profits tax in effect; indeed they would provide funds only slowly were the tax repealed. Bank loans do not, of course, help the working capital position. And I trust that we shall not soon see another era of large government deficits; even if that should be attempted I can see no chance of a substantial portion being monetized in view of the present capital structure position of the banks, quite regardless of the volume of excess reserves.

Therefore, a functioning capital market which will provide funds in volume to business seems to me to be a necessary condition to any

consequential improvement in business capital outlays, which means business activity, for some time to come. This does not mean that business cannot cease to decline, or that it cannot score some improvement without a new issue market. A turn can come, and some progress upward can be made. But I think the evidence is strong that this country will not see what we will agree is prosperous business for a number of years unless a good market for new capital issues is present. Hazard capital is most especially needed.

So much for recent changes and the present situation in the capital financing of business. In closing, I would like to raise, very briefly, some longer term questions on the same subject.

Provision for physical depreciation and depletion has become the most important single item of business capital outlays. This is indicated by the Kuznets figures, and others already cited. Figures provided by Mr. Laurence Sloan and associates for 135 industrial companies for the period 1922 through 1935 suggest the same fact. Inability to provide any details of gross capital outlays in these figures is regrettable, since they cover a longer period with annual income statements and balance sheets than any other series I know. But they do show that in 10 of the 14 years depreciation and depletion exceeded retained earnings, and that amounts reserved for depreciation and depletion greatly exceeded funds obtained by sale of senior securities net, in every year; unfortunately funds obtained by sale of equities is not given.

It seems doubtful that the amounts reserved for depreciation and depletion over a longer period of several decades have accounted for so large a portion of capital outlays. In years prior to the war I feel confident that new investment of funds borrowed from the capital markets was much more important. In short, it seems probable that business is gradually increasing the proportion of capital financing done through charges to current operations, and likewise the proportion of capital assets purchased with funds provided by internal sources.

This is a trend that is logical as our total capital equipment rises and as a growing part of expenditures on it each year are accounted for by expenditures to preserve it. Established businesses should be able to finance more of their requirements internally than newer businesses. Furthermore, the diminishing rate of population growth may well result in diminishing need for additions to assets; preservation of existing plant may be the chief requirement.

If this longer trend is a fact, then over the longer future than the next few years important questions are raised as to the function and

position of the capital markets. This question is provocatively discussed by Dr. Grebler in the 1937 winter number of the *Harvard Business Review*, including the points I have mentioned, and others as well. I suspect that the capital markets will be more and more important in business finance as a mechanism to permit the refunding of maturing securities, and less and less important, over a longer period of time, as a source of new capital for business.

This possibility raises one additional question. What, then will be the outlet for individual savings, if the savings habits of this country continue?

In short, the position of the capital markets is the most significantly changing factor in the capital financing of business. In recent years its importance has abruptly declined, almost to the vanishing point. During the next few years, its importance apparently must rise if we are to have prosperity as I think we will. And over the longer term, it appears likely that the importance of the capital market as a source for new capital is gradually declining.

CHANGES IN SECONDARY DISTRIBUTION OF EQUITY SECURITIES*

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When a corporation or underwriting syndicate disposes of a new issue of securities we think of original or primary distribution and we speak of the security as having been marketed. But this is really just the beginning of its market career. If it is really a worthwhile security it will have a long life following primary distribution; it will change hands many times; it will know many owners. This latter part of its market life may be called secondary distribution and will never completely cease unless it is retired for one reason or another.

Secondary distribution has been taken more or less for granted and there is a scarcity of material analyzing the process. The study of United States Steel stock by the late J. Edward Meeker is perhaps the best inductive work that has been done along this line. It shows in a convincing manner the nature of the two-way market that exists in securities, i.e., how from the time of its "speculative youth" to its maturity as a seasoned security it see-saws back and forth from the hands of speculators to investors as its price rises and falls. It is reasonable to suppose that the behavior of this stock is typical of many others even though definite verification is lacking. More studies similar to this one should be made but most corporations are unable or unwilling to supply the needed figures. In fact, research in this field has scarcely been started and basic data are quite incomplete.

The number of times an issue will change hands, the kinds of owners who will possess it, the extent to which investors sell to each other, the extent they sell to speculators, why investors sell, what happens to the proceeds and other similar questions remain for exhaustive investigation to answer. At present we have only inconclusive and very partial answers to these questions.

However, we do know that most of the purchasing and selling which comprises secondary distribution occurs over-the-counter and on stock exchanges. In fact the operation of these two types of markets is virtually synonymous with secondary distribution. Recently these markets have not behaved in their accustomed manner and secondary distribution has in turn been affected. The extent of this is not fully known but we may glean a few facts from the financial characteristics

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of the operations on at least one exchange. The most important single market of secondary distribution is the New York Stock Exchange, and since data on its functioning are more complete than for other markets the following analysis and statements will relate, largely, to it.

The major changes and their accompanying problems which have developed during the last few years in the field of secondary distribution center around (1) the lack of price stability, (2) extensive price advances without the apparent aid of a large volume of credit, and (3) the interruption in the growth of the number of stockholders owning the leading American corporations.

PRICE INSTABILITY

The declining stability of prices, manifesting itself in sharp movements of prices, has attracted more attention than any other recent characteristic. The evidence of this condition is more convincing in declining than advancing markets. Moreover, lack of stability in a declining market is likely to have more serious consequences.

Most of the available proof of this instability rests on rather general tests such as the following:

A study by the New York Stock Exchange of 30 important stocks reveals a sharp decline in the volume of trading which accompanies a given decline in price. Whereas 6 years ago these 30 issues averaged a turnover of 23,100 shares when their prices declined $1 per share in 1937 only 4,200 shares turned over with the same amount of price change. Or expressed another way: a 1 per cent price decline in 1930 was accompanied by a turnover of 13,100 shares but only 2,600 shares with a 1 per cent decline in 1937.

To see if this applied to a selected group of widely held blue-chip stocks an examination was made of the relation of price change to turnover in 7 securities (American Telephone & Telegraph, Pennsylvania Railroad, General Electric, duPont, General Motors, Westinghouse Electric, and United States Steel). The combined turnover of these stocks accompanying a 1 per cent change in price on the following days of important price declines was: October 29, 1929—21,900 shares; July 21, 1933—13,800 shares; September 10, 1937—4,100 shares; October 5, 1937—3,900 shares; October 18, 1937—2,700 shares.

The sales turnover ratios, i.e., ratio of sales to shares outstanding, for all shares listed on the New York Stock Exchange, in September, October, and November of 1929 were 12.83, 13.77, and 15.71 respectively, and involved an aggregate sales volume of 305,000,000 shares. For the same months of 1937 the turnover ratios were 2.42, 3.65, and 2.08 aggregated sales of 114,000,000 shares. It is interest-

ing to compare the change in aggregate market values for these two periods. In September, October, and November of 1929 the market lost 23 billions of value, or 26 per cent of its aggregate value at the beginning of the period. In the same months of 1937 the decline amounted to 16 billions of dollars, or 28 per cent.

In a period of 12 days of advancing prices in 1930–31 the seven widely held securities mentioned above averaged 24,200 shares of turnover when prices increased $1 per share and in a similar period in 1937 the same amount of advance was accompanied by an average turnover of 11,700 shares. Or stated as a percentage, a 1 per cent advance in 1930–31 was accompanied by a turnover of 17,300 and in 1937 only 8,000 shares. For the same period a somewhat smaller change is shown for the group of 30 important securities that were used to test the declining market. They averaged 18,500 shares for each dollar of advance in the 1930–31 period and 10,100 for 1937. There was a 1 per cent advance for each 11,300 shares in 1930–31 and 6,900 shares in 1937. It was surprising to find the small group of high grade securities more sensitive to change than the large group.

A recent issue of *The Cleveland Trust Company Bulletin* contains a test that is irrespective of price direction. For the year 1930 for each 1,000,000 shares traded on the New York Stock Market Exchange the average net change (totals of plus and minus changes disregarding signs) was 1,610 eighths; in 1934 this reached 4,000 eighths; and in 1937 over 5,000 eighths.

Although the foregoing discussion has been described as relating to instability it also contains evidences of lack of continuity. These two conditions are not identical because instability has usually referred to the extent of a price movement in terms of time elapsed, whereas continuity has related to the amount of change that occurs between transactions. Ordinarily the latter is taken to mean that an execution is possible at the last quoted price or $\frac{1}{8}$ of a point from it. When price changes average $1 per share on a turnover of 3, 4, or 500 shares it is obvious that many of the trades must be made at fluctuations greater than $\frac{1}{8}$ between transactions. Especially is this so if this is an average expressed in terms of the net change for the trading day, because actual trades do not always proceed in blocks of 100 shares and prices do not usually move in one direction, throughout an entire trading day. Apparently the markets lack continuity as well as stability. Even in those securities in which an average change of $1 has an average of 800 shares of turnover, continuity may be an empty expression when on a given day in two hours' time a turnover of 8,000 shares changes price to the extent of $10 per share.

Although this evidence of increased sensitivity may seem overwhelming it lacks the conclusiveness of case studies which would measure the deviations in terms of trend and determine the actual amount of change which has occurred between individual transactions.

The causes for such markets are not easily proved. Many persons have placed the blame on a small floating supply. Lack of data makes proof of this impossible but in United States Steel common the floating supply on March 31, 1936 was 21.75 per cent and had a continuous rise to 25.81 per cent on September 30, 1937. This is the highest percentage of floating supply this stock has had since June 30, 1927. Figures are not available, however, to prove this as typical.

Another explanation is: Antipathy toward the field of speculation generated by experiences of 1929 and the antagonistic publicity since that time may have caused a decline in speculative interest and activity. If the ignorant and uninformed members of the speculative public have been thus affected the result is salutary. It is a quite different matter if regulation has driven the informed or professional risk taker to other activities or the foreign markets. And this remark is not intended to belittle the necessity for controlling the operations of the professional group. To the extent they engage in manipulation and market mal-practices they need control. On the other hand they also perform a very real service which is frequently not recognized.

Markets exist primarily for the benefit of investors but it is impossible to have the buying and selling investor meet directly in all transactions because they are not in the market either at all times or simultaneously. Some intermediary, called a speculator takes or supplies that which an investor wants. He fills the gap, sometimes for a considerable period of time. In brief the speculator tends to balance the supply and demand between prices at which investors can be brought together. How much speculation is needed to do this is not known. The small amount of evidence at hand shows that moderate speculation tends to give the most stable prices. Extremes in either direction lead to instability. There is reason to believe that restraint of speculation may also be excessive and that speculators are not performing their usual services.

Comparative pre-regulatory figures on so-called informed trading are lacking but for the last few years we know the extent of the purchases and sales of the insiders (i.e., officers, directors, and large stockholders). Certainly during this period their trading has been relatively unimportant, in both advancing and declining markets.

Exchange member trading the last eighteen months has been so

constantly about $\frac{1}{5}$ of the total trading that it almost seems a function of volume and is not related to the nature of price movement. Presumably the ratio was larger in previous markets. In any event *if* the dealer function was being performed efficiently one would expect to find greater price stability. Many dealers claim they no longer step into the market as formerly and blame existing and anticipated government regulation for the change.

Higher margin requirements have no doubt been a factor in reducing the number of accounts and also the volume of trading but more complete discussion of this point is reserved until later.

Taxation is mentioned prominently as a cause, by some market commentators.

Do not construe these remarks to mean that a greater volume of speculation would have made any essential difference in the eventually attained price levels, but probably these levels would have been reached in easier stages and the uncertainty of a jittery market that could not weather shocks would not have been transmitted to the entire business community. General uncertainty of the future of business may be more important than all of the other reasons combined.

FINANCING SPECULATION

The second important change has to do with the financing of speculation. Brokers loans, volume of trading, and stock prices used to move in unison not only with reference to time but also extent; brokers loans in a rising market ranged from 8 to 10 per cent of aggregate market value. From January, 1927, to September, 1929, the market value of shares listed on the New York Stock Exchange increased 51.3 billions of dollars. In the same period brokers loans increased 5.4 billions of dollars. From April, 1935, to March, 1937, the value of listed shares increased 32 billions of dollars, and brokers loans increased only .4 billions. At first it might be supposed that the financing was done directly by the banks and did not show in brokers loans. This is not the case because total security loans of all reporting member banks increased less than 200 millions during this same period. If there is any thought that credit balances hid the real situation that is disproved by the size of customers debit balances and the decline in brokers loans in September, October, and November of 1937. Apparently an extensive price rise can take place without the direct use of any great volume of credit. No doubt the margin requirements of the Federal Reserve Board have served to restrict the known volume of credit which was used but the ability to maintain a flexibility of margins which could produce desired results has not been demonstrated. Thus in the

3-months' decline in values in the fall of 1937 a partial relaxation of credit restriction occurred only after the decline had run its course—a decline as severe in fact as that occurring in the fall of 1929. Previously it was rather generally believed that such a restriction on credit would also restrain prices. Perhaps huge idle deposits made possible a large volume of outright purchasing and this coupled with a low floating supply caused the rapid price advance. If the former were correct one would expect to see some evidence of this in an increased number of stockholders or in a marked increase in the holdings of large stockholders. Surface indications are that a large part of the trading was just a milling around, perhaps one group of investors selling to another without much aid from speculators. However, the information which would answer these questions definitely is not available. Brokers do not segregate customers accounts according to outright and margin transactions. Most corporations do not furnish adequate and prompt information on the changes in their stockholders nor do they classify them by groups according to the extent of holdings. Floating supply figures are available continuously for only one important corporation. More definite analysis of the problems herein suggested await the collection of these additional data.

Before proceeding to the third important change attention should be called to the less rigorous control of credit used for primary than for secondary distribution.

Under the Federal Reserve Board's Regulation U, Section 2, an exception to the loan requirements on security collateral is granted on "any loan to a dealer or two or more dealers to aid in the financing of the distribution of securities to customers not through the medium of a national securities exchange." This has enabled syndicates floating new issues to borrow a higher percentage of sale price than is permitted on seasoned securities.

The distinction between credit for new issues and credit to carry old ones could not rest on grounds of the doubtful value of the collateral therefore it presumably is a policy which makes it more appropriate to use credit to aid new flotations than to carry old ones. The justification for this would be clear if securities were like consumption goods and moved in a one-way market, i.e., if when sold to an investor they would never come back on the market. But all past issues except those of defunct companies are still in existence and constitute actual or potential market supply. Owners wish to sell from time to time to obtain cash, to shift from one security to another and for a multitude of other reasons. Whatever the reason for the sale we cannot very well decree that once you have purchased a security you dare not sell it.

Unless credit is allowed to facilitate this sale or exchange of securities capital cannot flow freely.

DECLINE IN NUMBER OF STOCKHOLDERS

The third important change in secondary distribution is the interruption in the upward trend of the number of stockholders. From the first quarter of 1929 to the first quarter of 1933 common stockholders in 50 leading corporations increased from 1,626,000 to 3,500,000. Every succeeding quarter was higher than the one which preceded. After the first quarter of 1933 the figure started to decline and at the beginning of 1937 had declined 100,000. A check was made of the same 7 widely held securities used to test instability. Their stockholders increased from 888,000 in the first quarter of 1929 to 1,756,000 in the first quarter of 1933. Since that time they have declined to 1,648,000[1] in the third quarter of 1937. This is a decline of 6.3 per cent and is much more severe than for the group of 50 stocks.

Further evidence of this condition is found in two surveys of stockholders: one for 1935 comprising 175 corporations and the other for 1936 covering 180 corporations. Both studies show declines although they are small.

A partial explanation for the decline in stockholders is to be found in a characteristic of an advancing market. Outright owners sell to margin buyers during periods of advancing prices and increase their holdings when prices decline. This process normally causes stock to concentrate in the names of brokers as prices rise. Conversely, the number of stockholders increases as prices decline and stock is being transferred from the names of brokers to individuals. However, the relatively small debit balances on brokers' books during the period under discussion indicate that the quantity of stock remaining in brokers' names to be transferred when the accounts were closed could not have been large. More interesting is the fact that the decline occurred during a period when the common stock was much publicized as a hedge against inflation and it would seem logical to expect persons to hedge in the time-tested equities. Perhaps the samples studied were inadequate if many persons were buying stock indirectly, especially through investment trusts. Data are not available to answer this.

There is yet another possibility. If the floating supply of well seasoned securities was in such demand that investors believed that small purchases of such securities sent their prices too high they might have placed their funds in less widely held securities. The fact that

[1] This is practically the same aggregate figure as that which existed at the end of 1936 although the stockholders declined a trifle in some corporations and advanced in others.

stockholders declined in 175 corporations in 1935 and in 180 corporations in 1936 would seem to discredit this thought.

Assuming that it is possible to prove conclusively that a decline occurred in the number of stockholders several interesting collateral questions might be raised at this point: why did investors sell? And what did they do with the proceeds?

Possible answers to these questions: a market rise gave them a profit and some of them wished to convert this to cash. Or they may have wanted to transfer their ownership to some other species of property. Possibly some of it went into consumption goods—(during 1935–36 this must have been by choice and not necessity). Or possibly it went into producers goods. However, it is not likely that it went into mortgages, and new issues of corporate securities (other than refunding) were small. We shall have to look elsewhere. The growth of bank deposits and government bond issues suggests that it found lodging places in these two items. In other words it was an attempt to increase the liquidity of assets. If the security markets had been functioning more perfectly the desired liquidity might have existed in coprorate securities although the fright of small capital may be attributed to many other factors.

SIGNIFICANCE OF CHANGES

Regardless of the causes of the current financial tendencies in the secondary distribution markets and their immediate market importance they have very significant and far-reaching effects on our national economy. If security markets functioned ideally they would provide correct evaluation of securities, give us ready marketability, and direct the flow of capital intelligently. None of these functions has ever been performed perfectly, and now there is evidence that in recent years their efficiency has actually declined. When a turnover volume from a few hundred to a few thousand shares of the stock of large and widely held corporations is accompanied by a change of $1 to $9 per share within a trading day, we can scarcely claim correct evaluation. This is more fully realized if we multiply these price changes by the number of shares outstanding. By no stretch of the imagination can we believe that the stock of a given corporation is worth 310 millions at 10 A.M. on Wednesday, worth 285 millions at 3 P.M. the same day, and worth 300 millions at 11 A.M. the following day.

Marketability implies ability to find a buyer at a price reasonably close to the last quotation. With the present instability of prices, the closing quotation is no indication of the price you will receive if you

attempt to sell the following morning. This uncertainty has been a growing one. It used to be said that we had continuity at the expense of stability. Now we have neither.

The intelligent flow of capital is predicated on the assumption that the price of a security in relation to its earnings will serve to attract or repel new capital. Unfortunately this function is dependent on correct evaluation. In its absence it is impossible to have a proper direction of the flow of capital. Nor is this all. It appears that capital is not flowing through the secondary markets in its customary manner. New capital flotations to finance private industry are facilitated when outstanding issues are absorbed by the general public. This absorption is usually evidenced by an increase in the number of stockholders. As the seasoning process progresses more small investors become stockholders and release the funds of former holders. The funds so released are available for investment in other securities, especially those of new flotations. The decline in the number of stockholders in seasoned securities is an obstacle to this performance.

Moreover, the decline in absolute number of stockholders is an indication of another very important development—namely, a lowered proportion of national savings is going into private securities. I believe complete inquiry into the questions previously mentioned: why do investors sell and how do they use their proceeds, is justified in order to reveal the way capital flows via secondary distribution and to discover the impediments to this flow.

Another less important but nevertheless interesting result is the tendency for trading on exchanges to decline relative to the total stock trading.

Many market experts have generally assumed that it was beneficial to the investors to have the transactions in their securities occur on organized exchanges where the actions of brokers could be more easily supervised and quotations could be given prompt publicity. If there is validity to the claim that the uncertainty of exchange prices has lead purchasers and sellers of large blocks of stock to make their commitments privately and over the counter there is reason to believe that the trading trend is away from centralized markets. It is impossible to obtain the over-the-counter figures because there is no centralized agency which assembles the volume and price at which transactions are made. However it is possible to make an estimate of the New York State Transfer Taxes derived from New York Stock Exchange and New York Curb Exchange transactions and compare this with the total transfer tax revenue received by New York State. A calculation of this

kind reveals that for the first 10 months of 1937 each of the Exchanges gave rise to a smaller proportion of the total revenue than it did in 1936.

In conclusion let me say this paper is intended to be suggestive rather than conclusive.

I think all will agree there is substantial evidence that the delicately adjusted market mechanism through which secondary distribution takes place has undergone considerable change and is not performing efficiently. To what extent these changes are symptoms of a common basic cause; to what extent they are the result of the market's inherent weaknesses, characteristics and interactions; to what extent they are interfering with the normal functioning of the economic machine, are questions which can not be satisfactorily answered without very extensive, intensive and expensive research. But these questions certainly merit attention at a time when there is an earnest effort being made to stimulate the flow of capital; every possible cause of the present blockade in this flow should be carefully examined.

CHANGED CONDITIONS IN THE MARKETING OF NEW ISSUES*

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Security marketing procedure in the United States has gone through a process of continuous change during the past century and longer. While the year 1933 doubtless marked the end of an era in the history of American investment banking, that era of itself had not been of long duration. It began with the World War period.

The causes of the sharp decline in the volume of new financing in recent years can be understood only after reference to these broad changes over the longer period.

SECURITY MARKETING BEFORE 1933

Four major epochs in the evolution of security marketing methods may be distinguished before 1933.

The first lasted from the early days of the Republic down to the Civil War. During this early period, the investment banking machinery of the country played but a modest role in bringing together issuers of securities and those who wished to invest in them. In fact, the "private flotation," or direct sale by issuer to investor without the mediation of an investment banker, except perhaps as an agent to facilitate the negotiations, was the rule.

Issuers were relatively few in number. The investing public consisted of a very limited number of financial institutions and wealthier individuals. There was no need for an elaborate machinery, under such circumstances, to bring together those who wished to raise long-term capital in substantial amounts, and those who desired to invest their surplus funds at long term.

The second era in the evolution of security marketing in America was ushered in by the Civil War. Cut off from foreign sources of capital, because its cause was unpopular in Europe, the Union government had to cultivate the domestic capital market very intensively to raise the sums, vast for those days, needed to carry on the war with the seceding states. This task was consummated successfully, with the help of greenback inflation, under the leadership of Jay Cooke, who formed a syndicate of investment houses which placed a total of some two billions of dollars of Federal government bonds. The investment banking machinery thus developed was turned to the flotation of large issues of railroad mortgage bonds, such as those of the Northern

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Pacific and Chesapeake and Ohio, after the war was ended. The panic of 1873, involving the collapse of many of these investment houses and of the railroads they financed, brought this first epoch of large-scale popular security distribution to an abrupt halt.

The third phase of investment banking evolution was marked by a narrowing of the American capital market. Individual investors largely turned to direct investments in business enterprises or real estate, or utilized the banks and insurance companies as investing institutions. The large distribution houses which dominated the investment banking business in the Civil War era gave way to the international banking houses whose strength lay in their ready access to rich foreign capital markets in Great Britain, Holland, and the Rhineland, and in their close connections with domestic investing institutions. During this period, the emphasis in the distribution of securities was shifted from retail selling, the chief function of the syndicates of the Civil War days, to underwriting or wholesaling.

The World War witnessed the inauguration of a fourth phase of investment banking evolution which lasted down to 1933. In many respects, this era resembled that of the Civil War. Once again, the government had to raise vast sums to finance a war, and perforce cultivated the domestic capital market to obtain the necessary funds. Bank credit inflation vastly facilitated the operation. Once again, persons newly accustomed to the purchase of bonds, as a result of an intense patriotic appeal to buy Treasury issues, subsequently bought other bonds as well under the pressure of aggressive salesmanship. In the twenties, vast distribution syndicates, numbering up to a thousand individual houses, were organized to sell, chiefly to individual investors, numerous issues of bonds of railroad, utility, industrial, real estate, and foreign issuers.

Since recent changes in security marketing practice are of significance chiefly with relation to this post-war period, we may summarize the latter's major characteristics as follows:

1. The emphasis upon the use of many thousands of security salesmen, who utilized a highly aggressive and personal technique in the sale of securities.

2. Speed was of the essence in the security distribution process, since underwriter and retailer both sought to avoid as far as feasible the risk of adverse price movements, regarding their function almost entirely as one of distribution rather than risk bearing. Often, distribution to the public began on the day when the purchase contract with the issuer was signed by the underwriters.

3. Keen competition among the numerous underwriting and distribution houses of the day made for a narrowing of the spread between

the price received by the issuer and that paid for the issue by the investing public. This price spread appeared particularly narrow when considered in relation to the low average quality of the issues floated.

4. While institutional selling was important, sales to individual investors were emphasized. In fact, the investment banking machinery during the twenties was geared mainly to serve individual, rather than institutional, buyers.

THE EFFECTS OF THE 1933 ACT

The enactment of the Securities Act of 1933 effected a number of basic changes in the investment banking business. Security selling was not subjected to specific statutory regulation until 1909. Since then, the states have enacted blue sky laws, mostly of limited scope. The innovation of a Federal law to regulate the origination and distribution of new security issues, and the changes thus brought about, would have alone sufficed to mark the inauguration of a new epoch in the evolution of the nation's investment banking business. Let us examine the changes wrought by this statute, therefore, leaving for later consideration the other forces which, in the writer's opinion, were far more important in bringing about the virtual revolution that has occurred during the past few years in the process of marketing new security issues in this country.

Underwriting has now become a far more specialized and hazardous function, as a result of the 20-day waiting period provided in the Act and the liabilities imposed by it. For at least 20 days after a registration statement for a new security issue has been filed with the Securities and Exchange Commission, no sale may be made by the underwriter. It is true that the purchase contract between the issuer and the underwriters may not go into effect until near the end of this 20-day period, and that often, but by no means always, a hedge clause may permit the underwriter to withdraw from his commitment before selling begins because of adverse market or other conditions. Yet underwriters are usually compelled to carry an issue for days or even weeks, where formerly they sought to pass on the issue to a banking group or distribution syndicate on the day when they signed the contract with the issuer, or very shortly thereafter.

The amendments to the Securities Act passed in 1934 greatly diminished the gravity of the civil liabilities assumed by underwriters and dealers for misstatements or omissions of material facts in a registration statement or prospectus. Civil suits must be brought within three years after an issue has been offered to the public. Usually a new security offering will not suffer a major decline in price during this initial period, so that there will not be much incentive for initiating litigation. Nevertheless, the possibility of such suits is an added reason

why organizations with small capital and limited ability to withstand litigation refrain from entering the underwriting business.

Since the original underwriters must bear the risk up to the time the registration statement becomes effective, there is no longer an incentive to share the profits of underwriting with other groups. Hence, the intermediate underwriting or "banking" groups common during the twenties, and the underwriting syndicates which both underwrote and sold, have disappeared. The process of security origination and distribution, as a result, has been very much simplified. In practically every case of a new security issue now, there is a purchase group of a few large underwriting houses who sign the purchase contract with the issuer, dividing the liability in fixed proportions among themselves, and a far larger selling group which does no underwriting, the members receiving a substantial selling commission only for securities actually sold by them.

The requirements of the Securities Act naturally increase the costs of flotation of new security issues. However, the available statistical evidence fails to show that this is of a burdensome character, except for quite small issues. On 120 bond issues registered with the Securities and Exchange Commission during 1936, the commission and discount averaged 2.2 per cent of the amount of the offering, and the other expenses 0.7 per cent. On 8 issues of less than $250,000 each, however, the commissions and discounts were 6.6 per cent, and the other expenses 1.7 per cent.

The burden of expense is naturally far greater in the case of common stock issues. On 120 common stock ussues floated during 1936, the average commission and discount was 16.5 per cent of the amount of the issue, and the other expenses 1.3 per cent. On 32 stock issues of less than $250,000 each, commission and discount were 20 per cent and other expenses 2 per cent.

In the above compilation, prepared by the Securities and Exchange Commission, a large part, but not all, of the "other expenses" are attributable to the Securities Act of 1933, particularly in connection with the preparation of the registration statement and pertinent exhibits. Doubtless, the underwriting spreads in many cases are higher than was the case for similar issues in the past because of the added liabilities involved, although the lack of adequate comparative data on spreads for most types of issues and the many other factors that affect the profit margin of investment bankers make an exact statement on this point impossible.

Issuers who find the Securities Act of 1933 burdensome and enjoy a strong credit standing can always circumvent the statute through effecting a private offering to a few large institutional investors. The

number of such private offerings has doubtless increased during the past few years. It would be unwise, however, to ascribe this entirely to the existence of the Securities Act of 1933. The change in the character of the capital market due to other influences, discussed at length below, is at least equally responsible for the increased popularity of direct sales of new security flotations by issuers to a limited number of large institutional investors.

One anomalous effect of the enactment of the Securities Act of 1933 has been a reduction of the amount of information that many individual investors obtain concerning a new security offering before purchase. Formerly, dealers felt free to include any data they regarded as pertinent in offering advertisements and circulars. While in numerous instances these circulars were far from exemplary in fullness or pertinence of the information presented, nevertheless they were often of great help to the layman in his appraisal of the nature and quality of the issue.

The prospectus issued under the Securities Act of 1933, on the other hand, is now a bulky and unattractive document containing far too much technical verbiage inserted merely to conform to the regulations of the Securities and Exchange Commission. Newspaper advertisements, on the other hand, tend to be limited to a mere statement of the bald facts of offering.

The Securities and Exchange Commission is expected soon to issue more flexible regulations that would permit a return to the more informative type of newspaper advertisement and the less technical form of offering circular formerly in use. Such regulations may help correct one of the unsatisfactory results of the functioning of the Securities Act, although the question of liability will still make for greater hesitancy in drafting selling literature.

CHANGES IN THE INVESTMENT BANKING MACHINERY

Profound changes have taken place in the structure of the American investment banking business since 1933, as the result both of the enactment of Federal regulatory legislation and other contemporary influences. These structural changes in turn exercise an important influence upon the ability of investment bankers to distribute a large volume of new security issues efficiently and cheaply.

The chief change has been a very sharp reduction in the number of strong underwriting organizations able and willing to handle the marketing of large security flotations. Many factors account for this. The more important have been:

1. Every major deflation period takes its toll of investment banking houses, owing to the large size of the risks that must be assumed by

such organizations in comparison to their capital, and the fact that a particularly unsuccessful underwriting impairs the standing of the house in the financial community, at least for a while. Hence, the depression of itself was the cause of considerable mortality among investment houses.

2. The Banking Act of 1933 eliminated bank security affiliates, which in 1930 were responsible for more than half the new public flotations.

3. The Banking Act of 1933 compelled private bankers to choose whether they preferred to remain in the private banking business or the security business, but they were not permitted to combine the two. The leading investment banking house, J. P. Morgan and Company, had been a private banker also, and preferred to remain such. It is true that new organizations have been formed, such as Morgan Stanley and Company, Inc., to take the place of these private bankers who have withdrawn from the issue business, but such successor organizations have been far smaller in size and have had only a fraction of the capital resources of their predecessors.

4. The facts that a protracted period of reduced activity has occurred in the capital market and that individual investors have so largely declined in importance as purchasers of new securities have led to a marked contraction in the investment banking machinery. This development has been very similar to that which came after the panic of 1873, which also brought to a close an era of widespread individual investment in new securities and was followed by a period when institutional and foreign buyers became predominant. The result has been not only a contraction in the number of active investment banking organizations, but a great decline in their average size.

This severe contraction in the number and average size of investment banking houses will probably persist for a long time. In the first place, it will be difficult to raise new capital to finance the business. Before 1933, only limited information was available about the capital resources of investment houses. It is known, however, that the security affiliates of the larger commercial banks had capital, surplus, and undivided profits of $30,000,000 and more in many cases before 1930, while private investment banking houses in several instances had similar resources running well above $50,000,000. Today, we find the head of one of the largest underwriting houses, The First Boston Corporation, stating that capital resources of some $13,000,000 would be fully adequate to finance the manifold activities of this organization, and that earnings beyond that sum would be distributed as dividends. Morgan Stanley and Company, Inc., was organized with an initial capital of $7,500,000. The large size of the liabilities incurred may be

seen from the fact that during the first half of 1937 Morgan Stanley and Company, Inc., entered into $92,420,000 of purchase group participations, while The First Boston Corporation, which stood second in this respect among investment houses during that period, assumed $77,163,000 of such participations.

There is no reason to believe that large amounts of additional capital will be readily forthcoming to finance the conduct of the investment banking business under prevailing conditions. It is apparent that the large size of the risks involved is being better appreciated. The fall in bond prices during the spring of 1937 occasioned severe losses to some houses, and the further drop in security quotations in the fall of the year imposed additional large losses upon underwriters. In the case of the one leading underwriter whose own stock is traded publicly, The First Boston Corporation, the shares are currently quoted well below the price at which they were originally offered.

For some time to come, therefore, the number and the average size of the organizations devoted to the origination and distribution of securities are likely to be much reduced by comparison with the post-war decade. Were a broad popular demand for new issues of investment securities to develop once again, however, so that the investment banking business would become as profitable as it has been in past periods of active flotations of new issues, existing organizations could be expanded and new houses would again enter the field, so as to meet the enlarged demands made upon them. The fact that a number of larger brokerage houses and investment trusts could, under existing restrictions, readily enter the underwriting business would facilitate such an expansion of the machinery in response to a favorable turn in conditions affecting the security business.

However, serious consideration might well be given to a relaxation of existing legal restrictions on underwriting by banks and insurance companies, to expand the machinery available for this purpose.

The contraction in the number and average size of retail security distribution organizations during the past few years has been fully comparable with that which has taken place in the underwriting field. Retailers who specialized in sales of bonds to individual investors particularly have had to effect a sharp shrinkage in their organizations. Many such organizations have revised their business to serve financial institutions that now constitute the backbone of the demand for bonds. In general, this change in clientele has necessitated a notable increase in the relative size of the personnel devoted by the average retailer to analytical and statistical work, and a contraction in the sales forces maintained.

Also, the factors making underwriting a more highly specialized

function, discussed above, have tended to bring about automatically a far sharper segregation of the underwriting from the retailing function than existed in the past. In this respect, the organization of the investment banking business in the United States has come to resemble that which prevails in Great Britain, where such separation of function among individual organizations exists to a large degree, far more closely than was the case a decade ago.

OTHER MAJOR FACTORS

Attention has been paid hitherto chiefly to the Securities Act of 1933 and, to a far lesser extent, the Banking Act of 1933 as causes of the changes in the marketing of new security issues that have occurred. But it is easy to exaggerate the effects of these statutes. A number of other and, in the aggregate, much more important influences have been at work.

The years 1928 and 1929 were abnormal as far as new financing was concerned, because the great boom on the stock exchange made new stock issues unusually saleable. For the eight year period 1920–27, new bond issues averaged $3,110,000,000, apart from Federal, State and municipal flotations. By contrast, in the four-year period 1934–37, with the year 1937 partly estimated, new bond issues aside from Federal, State and municipal offerings averaged $1,680,000,000, a decline of 46 per cent.

This sharp decline in the volume of new bond financing does not tell the whole story. During the twenties, the larger portion of the new offerings were classifiable, at the time of sale, as "middle grade" in quality. Put differently, we might say that probably the larger portion of the offerings were or would now be rated, at the date of issue, Baa or lower. By contrast, in the 1934–37 period, the larger part of the new flotations consisted of high grade issues rated A or better at the time of sale. In fact, the refunding of gilt-edged bond issues into lower-coupon offerings accounted for the largest part of new corporate issue activity in those years.

This fundamental change in the nature of the type of security that is being offered is attributable, in the first place, to the withdrawal of individual investors, by and large, from the bond market. This, in turn, has been due to a number of factors, the more important of which have been:

1. The severity of the depression of the early thirties, and the extensive character of forced liquidation of securities in the 1930–33 period. Middle grade bonds during this period suffered pricewise, by and large, almost as much as stocks. The prestige of the bond as a more conservative medium of investment was thus severely shaken and the rank

and file of individual investors could be expected to return to bond investment only after a period of readjustment in which bond prices would display an extended record of relative stability. The new severe decline in prices of numerous middle-grade bonds recently tends to prolong this period of transition indefinitely.

2. The poor average quality of the bonds sold in the twenties, which helps explain the bad price performance of these securities. American investment houses, spurred by the severe competition and the "New Era" psychology of the late twenties, promoted the sale of very many poorly secured, low grade, real estate, investment trust, foreign government and other issues that proved extremely vulnerable to adverse developments. Probably not since the earlier railroad promotion booms were so many poor securities floated under the guise of conservative investments in so short a period.

3. A very large proportion of the middle grade bonds outstanding consists of railroad and public utility issues. Both these industries have been subject to special unfavorable influences since 1929. The railroads have suffered from large-scale diversion of passenger and freight traffic to other transportation agencies, rigidity of wage costs and an excessive load of funded debt acquired in the past when railroad bonds were very readily saleable. In addition, enactment of Section 77 of the Bankruptcy Act provided a new and untried statutory procedure which has held up indefinitely the reorganization of weak roads.

In the case of public utilities, some holding company issues have been affected adversely by the enactment of the Public Utility Holding Company Act. Certain operating company bonds also have been affected by the Administration's program of government competition in the power business.

Since railroad and public utility bonds loom large in the portfolios of many individual investors in bonds, the poor performance of numerous such issues has acted to discourage additional investment in bonds generally.

4. The effort to spur economic recovery through monetary manipulation and widespread vague popular fears of "inflation" in 1933 and thereafter served to scare many individual investors from buying fixed income securities, causing them to turn to common stocks or merely to leave their surplus funds on deposit in banks instead.

5. The extreme easy money policy of the past few years has tended to drive down sharply the yields of the highest grades of bonds as financial institutions, particularly banks and insurance companies, have sought to obtain desired investments from the limited available supply. As a result, individual investors, accustomed to 5 and 6 per cent yields or more from their bonds, have had little incentive to

purchase these high grade new issues. It is true that very much higher yields have been available on poorer quality bonds, but the mortality among obligations in this category has been so high, as we have seen, that the rank and file of individual investors, who made up the backbone of the market for new bond flotations in the twenties, generally have refrained from purchasing them.

The above factors explain why individual investors can be expected to return only gradually to the market for new security issues. Also, they indicate that, for a time at least until confidence among them has been more fully restored, they will find acceptable only considerably higher quality bonds than were sold during the twenties. Securities which investors will buy after a major deflation period, such as that of 1930–33, must be of higher grade than those they purchased during an extended period of prosperity.

As long as the volume of high grade bond offerings remains restricted and middle-grade bond issues remain difficult to sell, we may expect to see the present pattern maintained in the investment banking business. A handful of organizations of limited capital facilities will suffice to carry on underwriting, chiefly of quite high grade bond offerings designed for sale to financial institutions. A larger number of retail distributing organizations with comparatively restricted staffs will be concerned with ultimate distribution of these issues, chiefly to institutions. Private flotations may gain in relative importance, since a handful of large financial institutions constitute so large a portion of the available market for new issues.

The investment banking machinery, as thus constituted, is far less effective than it was in the twenties as an agency for raising long-term capital in adequate volume at moderate cost for larger enterprises. It serves a much smaller segment of American industry. It will provide acceptable investment securities to absorb surplus funds to a far less numerous investing public.

The impetus for a renewed expansion of this machinery will probably have to come first from issuers of securities, who do not feel they now have sufficient incentive to bid for capital in the market on terms that would attract the rank and file of individual investors. Whenever the supply of acceptable offerings increases sufficiently, both the investment banking machinery and the number of prospective buyers will in all probability expand sufficiently to absorb them without difficulty.

THE SUPPLY OF NEW ISSUES

The above factors explain why individual investors, by and large, have played a greatly reduced role in the market for new security

issues. The field has been left largely to institutional investors, who have been ready to absorb the bulk of the new bonds now being offered on a very low yield basis.

However, the aggressive easy money policy of the Federal Reserve System could not have depressed the level of yields on high grade bonds if the demand for long-term capital on the part of corporate issuers were more nearly comparable to what it was during the twenties. Low prevailing yields on good bonds discourage individual investors from buying bonds, but it is important to remember that these low yields in turn reflect the greatly restricted demand for new capital. Were corporations whose credit standing is strong more eager to raise new capital, the supply of long-term, high grade bonds would soon largely exceed the demand from financial institutions for long-term issues. Then yields would have to rise, in order to attract the individual investor back into the market, regardless of the existence of excess bank reserves and easy money market conditions.

Experience indicates that individual investors will buy corporate bonds of satisfactory grade freely if they yield about 2 per cent more than do Government obligations. At least, that was true during the decade of the twenties. Hence, with Government bonds selling to yield about 3 per cent, the individual investor could be expected to re-enter the market for new bonds in large numbers when acceptable issues yield about 2 per cent more. Under present conditions, we may say, what investors in this country crave is a good 5 per cent bond.

Business managements, aware of depression experience, have generally become averse to increasing their bonded debt. They are also very hesitant about embarking upon long-range capital expansion programs which will involve new financing on a large scale. Hence, low and declining yields on high-grade bonds reflect a deficiency in the supply of such issues, and the existence of a demand that exceeds the current supply.

If leading steel, petroleum, automobile, chemical, and mail order concerns were as ready to incur funded debt as railroads and public utilities were in the past, there is little reason to doubt that individual investors would now buy their bonds, if available on a yield basis of about 5 per cent, as freely as rail and utility obligations were purchased in the past. Whenever such a development occurs, the investment banking machinery would doubtless be expanded to take care of it.

TENDENCIES IN CONSUMER FINANCING*

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For purposes of this discussion, the term "consumer credit" will be used to mean the sum of the accounts receivable of retail merchants, doctors, dentists, public utilities, and others who sell goods or render services to the consumer on a credit basis; the outstanding receivables of instalment finance companies; and the loan balances of lending agencies which deal primarily with consumers. It excludes loans against life insurance policies, savings bank passbooks, and the shares of building and loan associations which represent in varying degrees withdrawals of savings rather than loans. Real estate loans, which resemble other forms of consumer credit in some respects, are excluded because they involve special problems of interpretation. Loans between relatives and friends are also excluded because it is impossible to deal with them statistically.

I am aware that there are those who define consumer credit as synonymous with retail instalment credit. But such a narrow definition leads to unfortunate consequences. There is no functional difference between open-account credit and instalment credit, and a cash loan is frequently an alternative means of accomplishing a credit purchase. Moreover, a considerable part of the initial obligations created by credit purchases are refinanced by cash-lending agencies. All consumer debt grows directly or indirectly out of the sale of goods and services, and this gives an essential unity to the whole field.

This paper will deal principally with tendencies in the field of consumer credit during the last three years. But in order to provide perspective for the examination of recent trends, it seems desirable to review very briefly the development over a longer period of time.

Consumer credit is not a new phenomenon. The sale of goods on credit is as old as the process of exchange, and many present techniques of consumer financing may be traced to earlier centuries, if not to earlier civilizations. Yet when we discuss consumer credit today, it is obvious that we are dealing with an institution whose most significant features are of recent origin. These new features result from qualitative and quantitative rather than from functional changes. Among them are (1) the widespread use of consumer credit, (2) the increased amount of individual commitments in relation to incomes. (3) the use of powerful collection instruments as security, and (4) the development of a variety of specialized consumer credit agencies.

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These characteristics began to develop after the Civil War. First, the instalment system, which had been used successfully as early as 1850 for sales of sewing machines, was applied on a large scale to sales of furniture and other household equipment. A few years later came the growth of a business which lent small sums to wage-earners at very high rates of interest. It was not until around 1910, however, that the institutions of consumer credit began to attain their present form. The first credit union was organized in 1909, and the first Morris Plan Bank in 1910. A year later, Massachusetts enacted the first comprehensive small loan law; and by 1914 several enterprises had begun to acquire the characteristics of a modern instalment finance company. Informal advances by suppliers of goods and services continue to form the bulk of consumer credit. But even these relationships have been materially influenced by the techniques of the specialized agencies, and the modern era of consumer credit may be said to begin with their development.

Looking at the development of consumer credit as a whole, there appears to have been a gradual growth from the close of the Civil War to 1922, followed by a very rapid expansion up to 1929. In spite of the fact that the Russell Sage Foundation has been working for almost three years on a study of the quantitative aspects of consumer credit, it is still impossible to describe this growth in precise figures. Our data for the period before 1923 are fragmentary and even for later years only crude estimates can be made. Preliminary calculations, upon which we expect to improve very shortly, indicate that the amount of consumer credit approximated $4½ billion at the close of 1923 and reached a sum of about $11 billion at the close of 1929. All types of consumer credit contributed to the expansion during this six-year period, but the most striking increases occurred in the receivables of the new specialized agencies.

Why did this expansion occur? In the first place, certain general social and economic developments furnished the necessary conditions for expansion. Perhaps the most important was the rise of real incomes of the rank and file of the population, which tended to create family credit capacities by providing increasing margins above costs of subsistence. Associated with the rise of real incomes was the change in the characteristics of consumers' disbursements. Large expenditures for durable equipment had crept into family budgets, which not long before had been devoted principally to food, housing, and clothing. These new items were readily adaptable to credit merchandising. Other factors were the growth of cities, the growth in the number of wage-earners, and migrations to new industrial centers. Their effect

was to substitute the anonymity of city life for the mutuality of the "home" town, competitive standards of living for traditions of thrift, and complete dependence upon the market for a high degree of self-sufficiency with respect to the means of subsistence.

The stimulating factors, however, must be sought in the motivations of the parties to individual contracts. The most powerful influence toward expansion was the competitive pressure to sell merchandise. Credit was found to be an aid to sales. Hence, when one merchant offered credit terms, others were forced to follow. This pressure applied not only within the same field of merchandising, but between types of merchandise. Industries whose products were readily adaptable to credit sales increased their share of the consumer's dollar. Trade associations of competing industries explored ways and means of keeping their place in the sun, and frequently found them in devices for credit selling.

To permit this expansion of consumer credit, however, the consumer had to be willing to increase his commitments. The phenomenon of increasing indebtedness was described by some writers as an irresponsible plunge of the American family into debt. But I do not believe that such an interpretation is tenable. The great majority of people used credit thoughtfully with a weather eye to their solvency and ability to pay. *The increase in consumer debt could not have occurred on such a scale if initial credit commitments had conflicted with the accepted standards of family budgeting.* The consumer was acquiring durable goods, and the "pay as you ride" slogan had sunk deep into his consciousness. From his point of view, he had committed himself only to spend $10, $20, or $40 a month for the current use of a radio, or a washing machine, or an automobile; he was expanding both sides of his balance sheet—not going into debt. It is true, of course, that some consumers were irresponsible, that others exercised bad judgment, and that still others had their reasonable expectations upset by circumstances beyond their control. Because many contracts had to be refinanced over longer periods of time, consumer debt as a whole tended to increase more rapidly than initial credit commitments.

The expansion ended with the stock market collapse, or shortly thereafter. For retail merchandise credit, liquidation appears to have begun promptly; for industrial banks, credit unions, and pawnbrokers, it was deferred for almost a year; and for small loan companies, it was apparently delayed until early in 1931. There were also area differentials. Liquidation began more promptly in the industrial cities of the east and middle west than in the south and far west. The rate of liquidation was related to the former rate of expansion. In Detroit, Cleveland, and Chicago, where the expansion had been rapid, the

contraction was precipitate. But in Boston, Providence, and Philadelphia, where the boom had been tempered by economic handicaps, liquidation was more gradual. By the close of 1933, the outstanding amount of consumer credit had been reduced to about half of its 1929 level—roughly to $6 billion.

The completion of the liquidation, like the end of the expansion, occurred at different times in different areas and for different types of credit. The liquidation of retail merchandise credit was stopped abruptly by the revival of credit purchases in anticipation of higher prices in the early summer of 1933. The low point in the loan balances of endorsed-note agencies appears to have occurred somewhat later, probably in the spring of 1934. For small loan companies and pawnbrokers, the upswing was still further delayed. The low point for some areas appears to have occurred as late as the winter of 1935.

For consumer credit as a whole, the expansion got under way in the spring of 1934. The rate of expansion was slow at first, then increasingly rapid. The increase for the year 1936 seems to have been somewhere in the neighborhood of $2 billion, which probably exceeds the expansion of any previous year. This increase is the more remarkable because about one-fourth of the bonus payment appears to have been used by its recipients to liquidate consumer credit commitments. An even greater rate of expansion prevailed during the first half of 1937.

The recent expansion has taken place on several fronts. First, there has been an extension of the geographic frontier. In spite of intense competition in some areas in 1929, there were other areas in which specialized consumer credit agencies had not developed. The cyclical contraction between 1929 and 1933 encouraged the search for new markets in unexploited areas. Instalment finance companies and small loan companies opened branch offices in underserviced trading centers of the west and south. When the upswing began, expansion was exceedingly rapid in these areas. I am told that the small loan business in California has an atmosphere reminiscent of the Hollywood boom. Our own explorations indicate an enormous growth throughout the west in the number of places where one can borrow money or finance a credit sale.

Second, there has been a rapid growth of several credit institutions which were relatively undeveloped in 1929. Credit unions and personal loan departments of commercial banks have tripled their 1929 loan balance. Both types of institutions found their most fertile soil in unexploited areas such as California, Texas, and Washington. But they have also grown rapidly in areas where similar facilities were already well developed. Witness, for instance, the growth of credit unions in Ohio and Pennsylvania, and of personal loan departments

in New York, Massachusetts, and Virginia. The development of new credit facilities tends in itself to tap new sources of demand. It is remarkable that personal loan departments in New York City have been able to add some $30 million to their loan balance since 1928 without preventing an equally dramatic growth in the loan balances of small loan companies, and without materially reducing the outstandings of credit unions and industrial banks in the same area.

Third, credit merchandising has been extended to new types of goods and services. Electric refrigerators, which have been introduced to the mass market during the last few years, have been sold largely on credit terms. Home motion picture apparatus, sea cruises, the winter's coal supply, and fire insurance have recently been added to the area of instalment financing. Federal insurance of FHA contracts has stimulated the use of credit terms for home repairs and for heating and plumbing installations. Merchants who formerly shunned instalment terms have completely revised their policies, and quality stores have moved into the field of the so-called "borax houses" by selling "soft" merchandise on instalment schedules.

Still other means of attracting new credit applicants have been found. Delayed repayment schedules have been developed to appeal to certain types of borrowers. Types of security that created sales resistance have been discarded. The chattel mortgage or the wage assignment or both have been waived in many instances by small loan companies. The requirement of endorsements has been eliminated for certain types of loans by industrial banks, credit unions, and personal loan departments, and in many areas loans have been offered to persons of stable employment without any security whatsoever. A very important development has been the discovery of the family automobile as an asset which could be hypothecated for loans. A large automobile-loan business has been developed by discount companies, by small loan companies, and by instalment finance companies, garages, and filling stations in states without adequate small loan regulation.

Behind this most recent expansion of consumer credit were the driving forces which had motivated the expansion of the twenties—sales competition among merchants, and the acquisition of durable goods by consumers. There were, in addition, two new stimuli. The first was government insurance of credit contracts for home remodernization and repair, which had much to do with the liberalization of credit standards in many fields. The second was cheap money, which not only brought banks into the field of consumer credit, but also made it profitable for many consumer credit agencies to expand their operations on the basis of bank credit.

The rate of expansion began to decline this summer. The first depressing influence occurred in April when insurance of FHA Title I contracts was discontinued. Then in June, several prominent sales finance companies announced a policy of tightening their credit requirements. This action might have been converted into a mere gesture by the exigencies of competition were it not for several other events. First, the banks appear to have forced more conservative credit policies by balking at the acceptance of long-term, low down-payment paper as security for loans. Second, many individual credit agencies were approaching the limits of expansion under existing capital structures, and the weakness of bond and stock markets led to the postponement of plans for new financing. Third, the consumer himself, watching the stock market and the business news with apprehension, turned conservative. Present trends are confusing. Some types of credit are still expanding, while others are liquidating. But it seems safe to conclude that the expansion, in the aggregate, had ended by the close of October.

While comparisons are hazardous on the basis of the data now available, the expansion seems to have stopped at a level very close to the 1929 peak. The loan balances of small loan companies, industrial banks and pawnbrokers are below their former peak, but this differential is more than compensated by the higher loan balances of personal loan departments and credit unions. Retail credit is also lower, but the receivables of instalment finance companies far exceed their 1929 level.

It scarcely needs to be said that the consequences of the extensive use of consumer credit penetrate deeply into our social and economic fabric. It is beyond the scope of this paper to appraise the institution itself or to discuss the many problems which have accompanied its growth. I shall undertake only a very brief discussion of a single problem which I believe to be highly important, especially at the present time, and which seems to have been neglected or misinterpreted in the past, i.e., the influence of quantitative fluctuations of consumer credit upon economic equilibrium.

Let us examine for a moment the characteristics of a single deferred-payment transaction. We shall take a very common example, sacrificing precise accuracy to rounded figures: A wage-earner buys an automobile, priced at $800, on time payments. He pays $260 down, leaving a balance of $540. The charge for financing and insurance is $60, making a total deferred balance of $600 which he agrees to pay in 20 monthly payments of $30 each.

From the purchaser's standpoint, this transaction involved a reduction of $260 in his cash balance. But he has no sense of having

consumed $260 worth of merchandise. Consequently, he is unlikely to change his rate of consumption in other directions except so far as he must readjust his budget to meet later instalment payments. From the standpoint of the finance company which bought the contract from the dealer, the automobile was only partially consumed. The down-payment covered the immediate depreciation in resale value that occurred when the automobile passed into the hands of the consumer, and subsequent instalment payments would presumably exceed its depreciation with use. But from the standpoint of the automotive industry, the car was immediately and completely consumed, in the sense that it had been moved into the hands of a consumer and the purchase price had been delivered. Whereas the wage-earner's cash balance was reduced only by $260, the productive mechanism was stimulated by the immediate impact of the entire purchase price of $800. The difference between these two sums, $540, represents an artificial expansion of consumer's purchasing power. This sum is advanced to the automotive industry, moves through the industrial circulation, and reappears in large part as salaries, wages, and dividends long before the original purchaser has withdrawn it from the industrial circulation by completing his instalment payments.

This transaction differs only in degree from all other consumer credit transactions. Aggregate consumers' purchasing power is artificially expanded to the extent that the outstanding amount of consumer credit is increased, after allowing for unearned discounts and insurance premiums. In essence, the expansion of consumer credit represents a transfer of funds from the capital market into consumption. These funds must come either from savings or from an expansion of bank credit. If the rate of investment is lagging behind the rate of savings, this transfer may contribute to an equilibrium, not only by reducing the amount of funds seeking investment, but also by stimulating the demand for investment through the tertiary influences of increased consumer demand. If savings and investment were already in equilibrium, an expansion of consumer credit would increase production so far as additional factors of production were available and the process were not stopped by industrial bottlenecks. Thereafter expansion would merely inflate the price level.

Exactly the reverse of this process occurs when consumer credit is contracted. Part of the money which flows into consumers' incomes and which would otherwise be spent for consumers' goods is diverted to the repayment of debts, and is therefore transferred back again to the capital market. If this transfer were compensated by increased investment, the process would not result in deflation. But the tertiary influences of the contraction of consumers' purchasing power now

operate to reduce the demand for investment. Consequently, these funds tend to disappear through the liquidation of bank credit.

Consumer credit fluctuations appear to be the resultants rather than the causes of cyclical movements. But they exercise a powerful influence toward the acceleration of a cyclical trend once it is established. Expansion of consumer credit was undoubtedly an important factor in the prosperity of the twenties and its liquidation helps to explain the vicious-circle characteristics of the deflation of the early thirties.

The trend of consumer credit is an equally important element in the present business outlook. Its expansion, like the expansion of the federal government debt, which has precisely the same economic effect, contributed to the increase in business activity during the last three years. Both of these stimulating influences have now been removed. Among the many factors which are involved in the current business recession, the sudden elimination of these two stimulating influences is among the most important.

There is, however, one notable difference between federal deficit financing and consumer credit. Changes in the level of government debt are subject to control in the interests of economic policy. Fluctuations of consumer debt, on the other hand, are determined by the psychological outlook of thousands of creditors and millions of debtors. All the natural forces of competition and self-preservation lead to its expansion in the boom and to its contraction in depression. I do not believe that the credit capacity of consumers has been exhausted at present income levels. The pressure for liquidation does not appear to be great at the moment, but the potentialities of a rapid liquidation are disturbing. If this should occur, the problem of finding remedies for the present maladjustments in our economy would become much more difficult.

In conclusion, I wish to add a few words about the statistics of consumer credit. When our study was initiated, there were a few scattered and frequently incomplete state reports for small loan companies, credit unions, and industrial banks. For consumer loan agencies in other states, for the whole area of retail credit, for instalment finance companies, and for professional creditors, it was necessary to build up estimates by identifying the institutions and soliciting data from them, by culling the files of credit information services, by sample studies, and by a great variety of other devices. It has been a job for a detective rather than for a statistician. These methods have been tedious, expensive, and, in the end, only partially productive. We expect by spring to have a series of estimated year-end receivables for each of the principal types of consumer credit from 1923 to 1936.

Since this study was begun, and partly as the result of it, there has

been a material improvement in the current data. The number of state reports for consumer loan agencies has increased and their quality has improved. Several states have begun to collect periodic figures on personal loans of state banks. Only recently, the Census Bureau has initiated an excellent series of retail automobile receivables for finance companies. The Bureau of Foreign and Domestic Commerce and the Research Department of Dun and Bradstreet expect soon to initiate current series of receivables for various types of retailers. General interest in consumer credit statistics has increased enormously and it seems likely that we shall have, in the near future, useful current series for several types of credit.

If we are to have intelligible current figures for the whole field, however, there is still much to be done. The field of consumer credit is at present in a state of flux. Banks are rapidly increasing their part in consumer financing and it is essential to know something of the current trend of consumer credit balances in banks in order to interpret the figures for other types of agencies. Supervisory agencies have generally neglected not only the statistics, but also the adequate supervision of this type of bank service. The Census Bureau's figures for automobile receivables should be expanded to cover other retail financing. It is amazing that there are at the present time only the crudest of guesses concerning the total retail receivables of instalment finance companies. The federal income tax returns contain corporate balance sheets from which an annual series of receivables for various types of merchants and consumer credit agencies could be readily compiled. Such tabulations would serve to correct monthly series for biases which are unavoidable in samples based on voluntary reports. The field of receivables of doctors, dentists, and hospitals is still a statistical no-man's-land. There is also work to be done in the field of state reports. In many states, there is no public supervision of consumer loan agencies, to say nothing of official reports. In other states, there is some semblance of supervision, but no operating statistics are published.

There is a need not only for an expansion of the data of consumer credit, but also for coordination in the work of collecting them. The likelihood of wasteful duplication of effort is already apparent. I know of no field in which the centralizing influence of a committee of the American Statistical Association would be more useful.

CONSUMER FINANCING AND ITS RELATION TO THE COMMERCIAL BANK*

By David C. Barry, *Vice-President*
Lincoln-Alliance Bank and Trust Company

INTRODUCTION

Until recently, American commercial banking has functioned primarily as an aid in the financing of agricultural, productive, and commercial enterprise. Small loans have been confined to regular customers or selected individuals of a better-than-average financial status. Hence, commercial banking has depended almost exclusively upon service to business organizations and to propertied individuals. These traditional types of lending have been declining rapidly, for many corporations, formerly borrowers, have refinanced publicly and privately and thereby have become more independent of commercial bank credit. This trend has been a major factor in the decline of bank earnings. As long as these types of service produced adequate volume and earnings, the average banker remained indifferent to, if not unaware of, the possibilities in consumer financing. There may have been other reasons for this indifference, but it is highly significant that today a steadily growing number of bankers have awakened to the seriousness of situation where much business, which the regular banking system can and should handle, is escaping them and going elsewhere.

Indeed, billions of dollars of small financing have been handled by agencies outside the regular banks and their demonstrated ability to produce steady and excellent earnings during none too profitable years for orthodox banking has accelerated the banker's interest in this field.

Another consideration is concerned with the newly discovered importance and technique of the banks' public relations. Consumer financing provides a rare opportunity to appeal to the "man on the street" by serving the general public in an efficient and helpful manner. The extension of the bank's service to this wider group is a factor of good will, which should not be ignored and which may have a decisive influence on the ultimate future of a banking system in a democracy.

Paralleling this new interest on the part of the banker was a change in his attitude and relation to the finance company. Finance companies were originally regarded by most bankers as performing an unorthodox function which placed them outside the pale of the established banking structure. Others believed it was a venture into uncharted fields, but,

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nevertheless, deserving of banking consideration and support. These sympathetic banks and bankers expressed their confidence in a tangible way by the extension of fairly liberal credit lines for the use of finance company managements. Such loans have proved to be sound for the bank and so well handled by the companies that today there are few of the larger banks which do not have finance company obligations in their loan portfolios. In addition, the record of the finance company, with respect to its own operations, has been excellent.

In view of all these developments, it is not altogether surprising that some bankers have already changed and others are changing their attitude toward consumer credit. They have learned that a loan to plain Mr. John Jones is quite as good as any other loans they make; that in bad times and good, John Jones pays his obligation as agreed. They have witnessed the testing and proving period, and having observed the extremely satisfactory results, many bankers have become convinced that consumer financing is a legitimate field for their own operation.

BANK PARTICIPATION IN CONSUMER CREDIT

One of the most discouraging factors in the consideration of consumer credit, possibly one of the greatest dangers, is the lack of accurate and complete figures pertaining to its total use. Not only have we no complete figures or other data on the activity of finance companies and other allied agencies but neither do we have facts showing the extent of bank participation, either directly or through other lending agencies. Such general figures as are available are more familiar to a statistical body such as yours than to the speaker. Therefore, instead of quoting estimated figures for a large group, I am presenting the results of operations of a single bank in a typical American industrial city in the hope that these known facts from a given situation will enable you to draw some conclusions from this brief paper. If you are desirous of estimating the effects of a more general adoption of similar plans by banks, you can multiply by any factor you want to arrive at your conclusions.

Rochester, New York, is an industrial city of slightly more than three hundred forty thousand population, situated in a county of about five hundred thousand and serving a trading area of about three-quarters of a million. Its industries are well diversified and there is a fairly high wage rate. We did not reach the peaks in boom times nor did we go into the deepest valleys in depression times. It is probably better than an average industrial city as a test tube for experimenting in consumer credit. Banking assets of the city total $400,000-

000, including savings banks, and the total assets of the institution I represent are about one-fifth of the whole.

Our bank has an excellent physical set-up for consumer credit business consisting of a main office and eight branches, all but two of which are located in the City of Rochester. Practically all serve industrialized areas and have been established for several years. In addition, we have trained personnel and available space for centralizing our bookkeeping and accounting departments.

We realized an undertaking of this sort would present new operating problems but were confident we could solve them. Our operating procedure was somewhat complicated by the New York State Banking Law which had no specific provisions at that time governing personal loan business as it applied to the commercial bank. Later, the passage of the Stephens Act by the New York State Legislature clarified this situation somewhat and we now have definite operating conditions prescribed for us on personal loans.

Active participation in consumer financing was a matter to which our management had given a great deal of study and consideration for some time. Some of our officers had visited a number of institutions in the East and West which had been active in consumer credit. In addition, we, ourselves, had been initiated, in a small way, to this type of lending. We had been making loans under F.H.A. for several months and, for several years, had been administering a student loan fund trusteed with us by the University of Rochester. These deliberations crystallized in early 1935 when the directors of our bank courageously approved what we call a six-fold program of installment loan activity:

1. The F.H.A. Plan.
   (Modernization loans under the National Housing Act.)
2. The Budget Payment Plan.
   (Financing household appliances through dealers.)
3. The Personal Loan Plan.
   (Loans to individuals.)
4. The Auto Financing Plan for Dealers Only.
   (Wholesale or retail financing of sales of autos.)
5. The Aid to Industry—Local.
   (Financing of time sales of local manufacturers to local buyers.)
6. The Aid to Industry—Non-local.
   (Financing or arranging for financing of time sales of local manufacturers in other areas.)

These six have since been modified and added to, our entire effort being to keep our operations flexible enough to meet any legitimate demand for consumer credit that may arise.

At this point, I should like to emphasize that we do not look upon our activity as being limited only to the opening of a Personal Loan Department. We look upon it as a venture (or an adventure, if you prefer) into the field of consumer credit, wherever that field may lead us. We believed consumer credit might become an important factor with many of our local industries and we were, and are, prepared to discuss the financing of sales of local products, either to local consumers or to consumers located elsewhere. With this viewpoint as a background, the Personal Loan Department took its proper place in the whole plan.

Not all plans were immediately effective. The F.H.A. Plan had been in operation for about two years. The Budget Payment Plan, which was an arrangement for financing the appliance sales of some eighty odd electrical dealers and our local gas and electric company, became effective in April, 1935. The Personal Loan Plan began operations in June, 1935. This has given us about two and a half years of operations as a basis for our analysis and the results may be interesting to you.

By July 16, 1936, in all groups combined, we had loaned $1,813,000 to 10,442 borrowers which at that time had been reduced by payments to $1,056,000 and 8,846 borrowers. On July 15, 1937, these figures had increased to $3,797,000 originally loaned to 20,288 borrowers and the net outstanding had increased to $1,494,000 represented by 12,847 borrowers. As of December 16, 1937, we had loaned $4,732,000 to 25,244 borrowers, with a net outstanding of $1,608,000 represented by 14,759 individual loans.

The average loan of the group, as originally placed, was $187.20, with the average balance of the loan outstanding at this time reduced to $108.99.

These loans have been made for the general purposes indicated:

	Per cent
1. House and electrical appliances	39.90
2. Refinancing existing accounts	15.14
3. Autos and accessories	13.01
4. Real estate investment and home improvement	10.78
5. Dental, medical, and hospital	4.59
6. Interest, insurance, and taxes	4.15
7. Business purposes	2.43
8. Clothing	1.74
9. Education	1.07
10. Miscellaneous	7.19
	100.00

Looking at this purpose classification, we find that automobiles and automobile accessories have formed a very popular reason for borrowing. This is in spite of the fact that we do not finance for more than twelve months and have no variations in our plan to accommodate this kind of business. At the present time, we have not only loaned substantial amounts of money for this purpose but the rate of growth as shown on a ratio chart is more pronounced than any other major classification. It is interesting to note, however, and of particular interest to bankers, that during the first ten months of our personal loan experience, refinancing existing debts was the greatest borrowing motive and at the present time is exceeded only by automobiles and accessories and household appliances. Hospital and medical bills have followed closely in amount loans for furniture, repairs and improvements, with the latter slightly in the lead at the present time.

In our Personal Loan Department, we attempt to carry this analysis a bit further. Our application forms request information from our prospective borrowers which give us a certain amount of general information about this type of borrower. Among other things, we have attempted to classify our loans by type of borrower. Charts are kept showing the principal subdivisions of each classification. We admit frankly that accurate scientific standards cannot be used in determining each and every applicant's real purpose in borrowing or his exact role in our economic mechanism, whether he be butcher, baker or candlestick-maker. But we feel that on the average our totals show a reasonably correct picture. The charts show that unskilled labor is our best customer with skilled labor a close second, although clerical help borrowed in greater amounts than skilled labor during the first year of the plan. Government employees (mostly school teachers) have used this service quite extensively.

Delinquencies of all kinds to date (and by delinquencies we mean all installments more than seven days old) number 940 items for a total of $16,000, or just about 1 per cent of the net amount outstanding and about three-tenths of 1 per cent of the total amount loaned. There have been no chargeoffs during this two and a half year period and our best guess would indicate not more than $4,000 of the $16,000 in delinquencies will develop into loss items which, if it did occur, would be something less than one-tenth of 1 per cent on the total amount financed. This experience has occurred during improving business conditions and we are not unmindful that results during a period of recession may not be as favorable.

Obviously, such a result over so brief a period makes us feel confident this type of activity is not only a proper one but extremely desirable

for the commercial banker if he is situated in a community where the income of the majority of the residents is fairly regular.

In addition, the activity is productive of other business for the commercial bank and very frequently leads into installment equipment financing which might easily be financed through other channels if the banker were not installment finance minded.

FUTURE POSSIBILITIES FOR COMMERCIAL BANKS IN THIS FIELD

In attempting to outline the future possibilities for the commercial banks, attention must first be called to the inherent weaknesses in our banking system when attempting to meet competition of outside agencies.

Without taking any stand either for or against the dual banking system in this paper, nation-wide coverage by bankers which will effectively compete with finance companies is extremely difficult under our present forty-nine sets of banking laws. Perhaps the trend toward the extension of branch banking within certain areas or whole states will eventually make possible more effective banking competition. The Bank of America, in California, with its state-wide branch coverage, has given thorough proof of how effective bank participation can become.

Whatever the trend, the commercial bank has four courses from which to choose in determining its future policy:

1. Complete refusal to participate in consumer financing either directly or through loans to a finance company.
2. No direct lending but loans to a finance company.
3. No loans to finance companies but direct loans to others.
4. Loans to finance companies as well as direct loans.

If the banker adopts the first plan he has no consumer credit problem. If he adopts the second, that is, no direct lending but a willingness to loan finance companies, then he must become familiar with finance company operation and must determine for himself what good finance company management reflects in balance sheet and operating figures. If the banker adopts the third course, that is, no loans to finance companies but direct loans to others, then he has a different set of questions to consider. If the banker decides on the fourth course, that is, loaning directly and indirectly, then he must become thoroughly familiar with the whole field. He may have to decide that he will forego finance company business for direct lending particularly if the finance company feels itself strong enough to urge him to keep out of this activity. He may conclude there are limits to the amount of his commitment to all finance companies as well as limits to his direct loans.

After deciding upon his procedure, the banker might further plan whether he is going to seek cooperation from other banks or from finance companies. Cooperation between finance companies and the banks might be possible in two ways:

1. Feeding of business to the finance company by the bank when such business was of a character that permitted more efficient handling by the finance company.
2. Differential rate of interest to be paid by the finance company to the bank in the nature of a fixed charge by the bank for the establishment of a line of credit.

With this last suggestion there will be much difference of opinion and I want to digress a bit to remind you that in patents involving royalties there is a well-grounded theory that "making the royalty too high increases the urge to find a substitute." Just so is it in the relation of the finance company to the bank.

To be successful, the finance company must have large bank credit lines. These credit lines are necessary to permit rotation of loans and, in addition, provide the leverage necessary for profit for proprietary capital. The attempt to buy these credit lines too cheaply may increase the resistance to a point where banks generally go into the field and may eventually result in the complete withdrawal of the credit.

It would seem as though the banker had still another means of entrenching himself in this field. This would take the form of more complete cooperation among banks without regard to the finance company. Each participating bank might service each other's installment accounts in their respective areas for a fee. This would result in a complete matching of finance company nation-wide coverage which is not possible now.

One other word regarding decisions for the commercial banker. If alert, he has observed the gradually expanding field of the finance company. Much of this has been under the guise of equipment financing. While this is not consumer financing, it is direct competition to the commercial banker, made possible by successful consumer activity. He must measure carefully how much of this lending would have been his and how much more he is going to allow to go to others.

NEED FOR SCIENTIFIC APPROACH TO THIS WHOLE PROBLEM

In conclusion, it would appear that the whole field of consumer credit needs coordinated research. Such facts as are available are quite inadequate and we have no basis for accurately determining the effect of an increase or decline in consumer financing upon the business

structure. Whether or not there are potential causes of recessions within this field we cannot state positively. We see evidences of some concern regarding this in suggested investigation by Federal authority and by the questions raised regarding finance company subsidiaries of manufacturing companies. Conclusions reached by an impartial group such as yours would have a far reaching effect in future legislative action. So your conclusions may be definitely objective, I suggest the following for your consideration and study:

1. Cause facilities to be established to gather more accurate and complete data from all installment lending agencies.
2. Study legislative policies of State and Federal government with respect to lending authority, whether it be pawnbroker, licensed lender, finance company, credit union, industrial bank, loan association, savings bank, or commercial bank.
3. Study the ultimate place for all forms of "money credit," whether it be in our banking system or outside.
4. Suggest that Federal Reserve Bank require further segregation of its loan reports from member banks, this new subdivision to be "Consumer Credit Loans," including loans to finance companies.
5. Finally, for a specific study, it might be worth while to attempt to determine whether the commercial bank will ultimately absorb the finance company or whether the finance company will absorb the commercial bank.

A study by the American Statistical Association covering these five points would mean much to the banking profession in the years to come.

THE ECONOMIC FUNCTION OF THE SALES FINANCE COMPANY*

By Milan V. Ayres
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Contrary to a common impression, the sales finance company does not make loans to consumers. Its contacts with consumers are wholly thru the collection of installments on goods which the consumers have purchased. Many sales finance companies do indeed make loans in connection with what is known as wholesale financing or floor-planning. These loans, however, are made to merchants, not to consumers.

The sales finance company is a type of institution of rather recent creation. Apparently its birth occurred somewhere about the year 1914.

THE ORIGIN OF SALES FINANCE COMPANIES

The sales finance company is the offspring of the automobile industry, inasmuch as the first sales finance companies were formed specifically for the purpose of purchasing automobile installment paper. Installment selling, of course, was not a new device when the automobile industry adopted it. Furniture had been sold in this country on the installment plan for at least a hundred years before that, and many other kinds of goods for very substantial periods. While sales finance companies today are financing the sales of many kinds of goods besides motor vehicles, it is not at all certain that this type of institution would have been created if it had not been for the necessities of the automobile industry.

The automobile industry differs, and has always differed conspicuously, from every other important industry, with respect to its method of distributing its product. Automobiles are sold exclusively thru specific enfranchised dealers, whereas nearly all other products are sold thru all merchants willing to handle them. Automobile dealers are required to pay cash for their stock in trade before the receipt of each shipment, whereas most other merchants are allowed from sixty to ninety days to make payment. Very few automobile dealers have ever had enough capital to enable them to carry their own installment paper, whereas many other kinds of merchants can do that.

One of the reasons why an automobile dealer cannot carry his own installment paper is the fact that he has to pay for his new cars before

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he gets them. Another reason is that the merchandise he handles is costly and turns over very rapidly, so that his yearly volume is very large in proportion to his capital.

The finance company came into existence because of the insistent demand from purchasers that they be permitted to buy automobiles on the installment plan, and the utter inability of the dealers to accede to this demand unless they could immediately sell the installment contracts.

It is popularly supposed that the automobile manufacturers introduced the system of installment selling of their product, in order to increase sales. That is not true. They were all opposed to installment selling at first. The demand of the customers compelled installment selling, and thus directly brought about the creation of the finance companies. Naturally after finance companies had proved successful in the automobile field, some of them expanded their operation to finance other kinds of goods, and other companies were formed for the purpose of operating exclusively outside of the automobile field.

The number of sales finance companies increased very rapidly between the years 1919 and 1924, and apparently has not changed very much since the latter year. Unfortunately, no one has ever made an accurate count of such companies, but apparently the present number in the United States is in the neighborhood of 1,500.

EXTENT OF BUSINESS

It is a regrettable fact that there exist nothing like complete statistics of finance company operations. The only regularly available figures are to be found in the monthly reports prepared by the Department of Commerce on automobile financing. These are compiled from returns made by 456 companies. These companies purchased during 1936 a total of $1,716,000,000 face value of installment notes arising from the retail sale of motor vehicles. They also did a large amount of wholesale financing in this field. That is, they made a great many loans to motor vehicle dealers to enable them to purchase their stock in trade. The total face value of these loans amounted to $1,704,000,000. Thus, that year the total of wholesale loans made happened to be identical with the total face value of retail installment notes purchased, within a fraction of one per cent. That was accidental however. There is no necessity for these amounts being anywhere near equal. In 1929 wholesale volume was only 42 per cent of retail volume. That ratio increased each year until 1935, when wholesale exceeded retail by 21 per cent, dropping to equality in 1936.

I believe that these figures probably cover about 95 per cent of the

automobile financing done by sales finance companies. If that is correct, the total volume of such retail financing amounted to about $1,806,000,000. Unfortunately we have no statistics on the financing of goods other than motor vehicles. My guess is that it amounts to one-third of the motor vehicle volume. That leads to a figure of $2,408,000,000 as the probable total value of all retail installment notes purchased by finance companies in 1936.

There is a popular tendency to confuse installment volume with installment debt. The two things are very different, first because installment volume includes the cash down payment, and second because each installment contract is constantly being paid off.

Thus the 1936 retail volume of $2,408,000,000 is very much more than the existing installment debt at any one time represented by these transactions. The automobile installment receivables of the four largest finance companies on December 31st represented 62½ per cent of their combined retail automobile volume for the year. If this figure is applicable to all of the finance company retail business, and I think it cannot be far wrong, we arrive at the figure of $1,505,000,000 as the amount which retail installment purchasers owed to finance companies at the end of 1936.

Wholesale receivables were very much less, because, in the first place, very little wholesale financing is done outside of the automobile field, and because, in the second place, instead of being paid off during a period of from one to two years, the wholesale loans are all made on single notes of thirty to sixty days. I estimate wholesale outstandings at the year's end at $247,000,000, which would mean that the total receivables of all the sale finance companies at that time amounted to $1,752,000,000.

INSTALLMENT SALES DATA

These finance company figures are not identical with any statistics on installment sales, for the reason that finance companies do not by any means finance all installment sales. Many banks are in competition with them for the business; and many merchants including some automobile dealers, keep a part or all of their installment paper and collect it themselves.

The Department of Commerce, on the basis of the retail census for 1935, has estimated that total installment sales in 1936 amounted to four and one-half billions of dollars. It we assume that 25 per cent of that was paid in cash, we get $3,375,000,000 as the volume of installment debt created, and if we again assume that 62.5 per cent was outstanding at the end of the year, we arrive at $2,109,000,000 as the total installment debt at that time.

To recapitulate, the principal figures are as follows:

Installment sales	$4,500,000,000
Debt created	3,375,000,000
Purchased by finance companies	2,408,000,000
Per cent purchased	71.3
Debt outstanding at end of year	2,109,000,000
Held by finance companies	1,505,000,000
Held by others	604,000,000
Wholesale loans of finance companies	1,800,000,000
Wholesale receivables of finance companies	247,000,000
Total receivables of finance companies	1,752,000,000

Perhaps I ought here to mention certain figures purporting to represent the existing installment debt, which have received wide publicity in recent months. One figure widely quoted was $9,000,000,000 and another was $13,000,000,000. Both of those estimates were gross exaggerations. There can be no reasonable doubt that the true figure is closely in the neighborhood of $2,000,000,000.

BANK BORROWINGS

Nearly all sales finance companies borrow from banks the greater part of their working funds. It is considered entirely normal for a finance company to be borrowing two and one-half times its own capital and surplus. Thus if it has three and one-half million dollars invested in receivables, it may be that two and one-half millions, or 71 per cent of the whole, is borrowed bank money. At the end of 1936 the finance companies were probably in debt to banks in the amount of about one and one-quarter billions of dollars.

FINANCE COMPANY FAILURES

It has been said that during the depression no bank lost any money by reason of a finance company failure, while many finance companies lost money by reason of bank failures. That statement is very nearly correct. In fact, from the beginning of finance company existence, there have been hardly any failures of such companies resulting in serious loss to their bank creditors. This is true in spite of the fact that banks habitually loan to sales finance companies much larger sums of money than they would to practically any other kind of business enterprise with the same net worth.

This remarkable record is due principally to the very great diversity of risk and to the fact that the vast majority of installment purchasers pay up, even in periods of depression. The greatest risk of loss to a finance company is in its wholesale loans, and not in its retail install-

ment purchases; but because the wholesale loans are always secured by salable merchandise, serious losses, even in this field, seldom occur except thru deliberate fraud committed by the dealer.

Some finance companies have failed, usually as a result of mismanagement, tho in a few instances thru fraud, but nearly always the assets have been sufficient, or almost sufficient, to pay the creditors in full.

THE ECONOMIC FUNCTION

All of the foregoing may be regarded as preliminary—I think a necessary preliminary—to a discussion of the subject assigned to this paper, namely "The Economic Function of the Sales Finance Company."

The most obvious thing that the finance company has done and is doing is that it makes possible a much larger volume of installment selling than otherwise could occur. This function was first exercised in the motor vehicle field. It is also operating in connection with the sales of the more recently developed kinds of typical installment goods, such as electrical refrigerators, washing machines, oil burners, household stokers, and radios.

I think that there can be no reasonable doubt that by facilitating installment sales, the finance company has been an important and essential factor in speeding up the adoption of such new and comparatively expensive devices as the automobile, the electric refrigerator, the oil burner, and the household stoker, and in so doing has advanced the rapidity of their development. I am convinced that if there had been no finance companies, all of these good things would today have been in much less general use, would be produced in much smaller volume, would be more costly per unit, and would be of poorer quality than they actually are. It is impossible to evaluate these effects in numerical terms. We cannot reasonably say that the number of these things being purchased today for cash would be purchased if there had never been any finance companies nor any installment selling. I feel quite certain that that is not true, and that present day sales would be even less than such a computation would indicate, because if there had never been any installment financing, these things would be more costly and less desirable, both of which attributes would cause fewer sales.

The sales finance company does more than facilitate installment sales. In the automobile field today, and to a less extent in some other fields, the finance companies are exercising a function which might seem to be more properly that of the commercial banks. The figures which I have already given in regard to wholesale financing are evi-

dence of that fact. You might well ask "Why do the finance companies exercise that function? Why do not the banks do it?" The principal reason is that these wholesale loans are secured by liens on the individual motor vehicles or on individual refrigerators, or other articles; and experience has shown that in order to do this business safely, it is necessary to make frequent periodical checks to determine that these articles which constitute the security for the loans are actually in the possession of the dealer, that they have not been "sold out of trust" without the payment of the loan secured by them. The banks don't like to do this checking and are not equipped for it.

The first sales finance companies were not created to do wholesale financing. The business was forced upon them thru the necessity of the automobile dealers to have this service and the unwillingness of the banks to perform it. This situation had developed by 1919 to such an extent that one of the specific purposes of General Motors Acceptance Corporation, which was created in that year, was to furnish wholesale financing for General Motors dealers. Now nearly all automobile finance companies do both retail and wholesale financing.

This combination of retail and wholesale financing has effects further back. In reality it finances the manufacturers, by enabling them to get spot cash for their output instead of waiting thirty, sixty, or ninety days. It has enabled them to avoid large amounts of borrowing which otherwise they would have to do. The automobile manufacturers adopted their policy of "sight draft with bill of lading" at the beginning because they had to. Bankers almost unanimously distrusted the automobile manufacturing business. They felt it could not succeed, and they felt also that it was contributing to the creation of ruinously expensive habits among the common people. The banks simply would not make loans to the manufacturers and they had to get cash for their product or go out of business. After the custom of getting cash had been well established, it proved so satisfactory to the manufacturers that they were never willing to give it up, but they have been enabled to continue it only by reason of the services provided by the finance companies to the dealers.

CONSUMERS GOODS VERSUS CAPITAL GOODS

We customarily think of installment selling as a phenomenon connected with the sale of consumers' goods, but for very many years an appreciable amount of it has been occurring in the sale of capital goods, that is, goods to be used in manufacturing or in conducting some other business. Some students of the subject have been so impressed with the importance of the distinction between consumers' goods and capital

goods that they have attempted to define installment selling so as to exclude capital goods, and have endeavored to confine installment selling statistics or calculations to data relating to consumers' goods only. This cannot be done with any accuracy for two reasons. In the first place, most of the presently available statistics do not make the distinction, and in the second place, there are a multitude of instances in installment selling where it is practically impossible to decide whether the goods belong in one class or the other.

The figures previously given relating to motor vehicle financing include trucks, yet trucks presumably are capital goods. They also include an immense number of automobiles which are used both for business purposes and for pleasure. It is impossible to make the desired classification. The census figures on installment selling include great numbers of mechanical refrigerators, oil burners, and stokers which were installed in homes or in apartment houses as a part of the permanent equipment, as well as some lumber, plumbing supplies, and the like sold for permanent incorporation in buildings. Were those consumers' goods or capital goods?

Outside of this overlapping field, however, manufacturers are selling on the installment plan, and finance companies are financing, considerable quantities of manufacturing and power plant equipment as well as equipment for stores and repair shops, all of which can be readily classified as capital goods. In doing this, the finance companies are to some extent taking the place of commercial bankers or even of the bond houses, because sometimes the alternative to buying machinery on the installment plan is the sale of a bond issue.

PAYING WHILE USING

One of the arguments sometimes used in defense of installment selling is that the installment purchaser is really paying for his goods as he uses them instead of paying before he gets them. There is much truth in that view. We commonly hear the statement that the installment buyer is mortgaging the future, but so is the man who rents a home and signs a lease agreeing to pay a stated amount per month for the next twelve months. In both cases he pays while using. The principal difference is that with the installment purchase he pays the full price during the first part of the period of use, after which use continues without further payment, while in renting a house, payments are spread over the entire period of use.

REPOSSESSIONS

Of course people sometimes make installment purchases which they cannot afford. One of the functions of the finance company is to pre-

vent this where possible. And they frequently do prevent it by impressing upon the dealer the fact that they will not buy installment contracts made by people who have insufficient income with which to pay, or who are already loaded up with debt. They prevent specific instances of such over-buying by refusing to purchase proposed contracts of that character. Nevertheless, they cannot prevent it altogether.

In 1936, 2.2 per cent of the new cars financed by the sales finance companies were repossessed, and 7.5 per cent of the used cars. That means practically that out of every one thousand people who purchased new cars on installments, twenty-two lost the vehicles purchased and what money they had invested in them, while seventy-five people out of every one thousand who had bought used cars had similar losses.

REPOSSESSION LOSSES

Percentages of repossessions, such as those above quoted, should not be confused with percentages of loss resulting from repossessions. Loss figures are much smaller because of the recoveries thru the sale of the repossessed property. The Retail Credit Survey gives the percentage of bad debt losses on installment credit accounts for 1936 for twelve kinds of retail stores. The loss ratio for automobile dealers is four-tenths of one per cent and for household appliance stores 1.2 per cent. The weighted average for the entire group is 1.2 per cent. The worst loss ratio is that of jewelry stores, which is 4.5 per cent.

No comparable figures are available for finance companies, but a computation based on the best available data indicate repossession losses of sixty-five one-hundredths of one per cent for motor vehicle financing.

TENDENCIES

I have not said much thus far which would properly come under the head of "Tendencies." There has been a tendency for many years for the total volume of installment selling to increase, but not very much tendency toward an increase in the installment selling percentage of any one particular kind of goods. The percentage of automobiles sold on installments is smaller now than it was ten years ago. In all probability, the percentage of electric refrigerators, furniture, washing machines, and most other kinds of specific items sold on installments, is less now than it was in 1929. The tendency for the total volume of installment selling to increase has been principally due to the increase in the volume of sales of those types of goods most adaptable to installment selling, namely fairly long lived articles which cost more

money than the average householder can readily spare at one time. In all probability, the volume of installment selling, as well as the percentage of installment sales to total retail sales, will tend to increase in the future by reason of the introduction of new articles or devices coming under this classification, and the increasing importance of such items in the family budget, due to a rising standard of living.

There has been a tendency during the past few years toward smaller down payments and longer time to pay out, and right now there is in operation the reverse tendency, namely, the exaction of larger down payments and a reduction in the length of time to complete payments. The New Deal, thru its offspring, the Electric Home and Farm Authority, and the Federal Housing Administration, was a principal factor in bringing about smaller down payments and longer time. These two New Deal agencies widely advertised the idea of nothing down or very little down, with from three to five years to pay, and this propaganda had its effect on the entire installment selling field.

The banks have been an important factor in the recent reversal of this tendency. It has been possible for the banks to exercise a strong influence in this direction by reason of the fact, already mentioned, that finance companies borrow a large part of their working funds from the banks.

The banks, for the past year or so, have been urging finance companies to insist on more conservative terms, and they in turn have been impressing upon the dealers the need to write more conservative terms into their installment contracts.

I do not wish to convey the impression that the present tendency to restrict installment terms is due entirely to the banks. Many of the dealers, and nearly all of the finance companies have had the same idea that installment terms had been made too easy. While this easing of terms may have been helpful in the climb up out of the depression, prudence suggested that more conservative terms ought to be adopted prior to the occurrence of another depression. Pressure from the banks, however, undoubtedly did much to activate this feeling.

GOVERNMENT REGULATION

Probably every year for several years past there have been bills introduced in one or more of the State Legislatures aiming at some kind of regulation of finance companies. Only two such bills have been passed, one in Wisconsin and the other in Indiana. The Wisconsin law is confined to the automobile field and is much more of a law to regulate automobile selling than it is to regulate finance companies. So far as the latter are concerned, it is of very little effect. The Indiana act

attempts to cover the entire field of installment selling of any kind of goods up to $1500 in value, and to regulate finance companies purchasing installment contracts resulting from such sales. The Department of Financial Institutions is the regulating authority. As it has been administered, the act has not proven particularly objectionable; nor, I think, has it accomplished anything worth while.

What most of the advocates of regulation are really seeking is a means of putting a limit upon the finance charge, namely, the amount by which the time price exceeds the cash price. The difficulty with that idea is that it can only be accomplished by regulating every merchant who sells on the installment plan. To accomplish the purpose effectively it would be necessary for the supervising authority to determine both the cash price and the time price, which would be the extreme of price fixing. I am not at all sure that the movement to regulate sales finance companies will go much further than it has.

When I speak of regulating finance companies I mean government supervision and control of the operations of finance companies. It is the movement to do that which I think will not go very far. Further, I believe such regulation is unwise and unnecessary.

Some of the things which the would be regulators want to bring about can much better be accomplished, if they are worth while, and probably some of them are, by changing the laws which relate to the forms of the legal instruments used in installment selling and to the rights of sellers, buyers, assignees, and third party claimants.

DEBT-INSTALLMENT AND OTHER

It may be worth while to make some comparisons between available installment debt figures and certain other comparable data. For that purpose I shall confine myself to the year 1935 because of the availability of the information.

In that year, according to the census of retail distribution, retail installment sales amounted to 10.9 per cent of all retail sales. In the same year open accounts sales amounted to 21.3 per cent of all retail sales, so that the open accounts sales were practically twice as great as the installment sales.

According to the Retail Credit Survey, covering 1,367 stores of fourteen different classifications, collections each month on the open credit accounts amounted to 45.3 per cent of the outstandings at the beginning of the month, while the corresponding figure for installments accounts was 13.9 per cent. Assuming that these figures apply to all retail stores, and assuming further that in the case of installment sales 25 per cent of the price was paid down in cash at the beginning,

we can calculate that the average outstanding debt on the open account sales was $1,273,000,000, and on the installment sales $1,597,000,000. That is to say, the installment debt was only about 25 per cent greater than the open account debt.

According to a pamphlet issued by the Department of Commerce, long term debt in the United States at the end of 1935, including both private and public debt, amounted to $118,537,000,000. Also at that time total outstanding bank loans amounted to $20,329,000,000.

Thus, while the installment debt was only 25 per cent more than the total debt owed to retail stores on charge accounts, it was equal to a little less than 8 per cent of the outstanding bank loans and to only 1.35 per cent of the long term debt, consisting of stocks, bonds, mortgages, and the like.

Doubtless some of you have read Richard Dana Skinner's book "Seven Kinds of Inflation," and have been impressed by his argument that debt is the principal cause of the booms and depressions of the business cycle. He proposes a new system of banking and of financing whereby debt would be almost eliminated and the ownership of equities would be substituted. I cannot here, of course, review the details of that plan. I wish to mention only one minor portion of it, which is the suggestion of a system of "rental agreements with optional purchase prices, in place of installment debt contracts." What I want to point out is that such a substitution would make no difference.

The legal device by which automobiles and other things are sold on installments in England is called the "hire-purchase system." It is just what Mr. Skinner suggests. The legal instrument which is principally used in Pennsylvania, and to some extent in Massachusetts and other states, is called a bailment lease and it is in effect the same as the English system. It is a sort of legal subterfuge by which the buyer leases the goods from the seller in consideration of the payment of a stated rental each month for a given period, at the end of which time he is priviledged to buy the goods by payment of a nominal sum. The effect of this system on the buyer, on the seller, and on the economic system is no different at all from the effect of buying under the more usual forms of installment instrument, which are the conditional sale contract and the chattel mortgage.

If Skinner is right, and I believe he is at least on the right track, in his analysis of the causes of the extreme fluctuations of the business cycle, then each type of debt should be subjected to close scrutiny to evaluate its share in the causation of booms and depressions. It is notable that the installment debt is certainly less than one and one-half per cent of the total debt, and probably not more than one per

cent. On that ground it would seem that its contribution to booms and depressions must be very slight.

Of equal significance is the fact that the installment debt has largely the characteristics of an equity holding rather than a straight money debt, is progressively liquidating over a relatively short period of time, and is in short already of the character which Skinner recommends as one of the elements of his proposed system for avoiding the recurrence of booms and depressions.

PUBLIC SUPERVISION OF CONSUMER CREDIT*

By William Trufant Foster
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A swimmer with a load on his back, struggling to keep his head above water, would hardly want handcuffs added to his troubles. About as welcome at the present time are proposals for further governmental regulation of business. Already too much regulation of the wrong sort has had its part in cutting down employment, production, and real wages.

Nevertheless, more effective public supervision of certain consumer credit agencies is desired by some of these agencies themselves. A proposal before the General Court of Massachusetts for state regulation of instalment selling and financing was favored by at least one of the large finance companies; the Credit Unions have favored federal and state laws for the regulation of Credit Unions; and leading personal finance companies have long favored more stringent laws for the regulation of their business, in states where workable laws exist; and are still asking for stringent laws, in such states as Texas, Washington, and Minnesota where, with freedom from state supervision, the business of making small loans to necessitous borrowers is a chaotic scandal. Further regulation of some sort over various consumer credit agencies is certain to come. The more effectively we study this problem, with the guidance which statistics can be forced to yield, the more likely we are to prevent unwise legislation, much of which is now under consideration by Federal and state law-makers.

WHY SUPERVISION IS NEEDED

For many centuries, the need of public supervision of money lenders has been evident mainly because, on account of the strategic bargaining position of the lenders, freedom of contract has enabled a powerful group to exploit a weak group. Always the necessitous borrower has had to take whatever he could get, wherever he could get it, on whatever terms he could get, often without knowing what the terms were. He has been in no position to bargain.

Partly for this reason, public supervision of banks, personal finance companies and other agencies which make cash loans to consumers is now accepted as a matter of course. Yet the business of instalment selling which, in effect, appears to have made last year roughly three billion dollars of small loans to consumers, is as free from regulation as the small loan business was a generation ago. Over the agencies

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which finance time sales, federal and state authorities, except in Indiana and Wisconsin, have no special supervision.

Yet, the more one studies the numerous agencies which provide consumer credit for the millions, the more one is convinced that all are much in the same boat. Instalment contracts often are refinanced as money loans. Agencies which make money loans often finance instalment purchases. Many commercial banks are now in both lines of business. There is, to be sure, this difference: sales finance companies do not make loans of actual cash to consumers. From the point of view of the consumer, however, this distinction has nothing to do with the question of the need of regulation. If the finance company did not enable the instalment buyer to make periodic payments on his purchase, he would have to borrow the money of some other agency and assume similar obligations as to payments. He would not care whether what he paid for the privilege was called "interest," or "carrying charges," or something else.

Always there is a "carrying charge," whether it is called by that name or by some other name. Always the consumer pays the charge, even when he is assured that there is "no carrying charge." All those who do the financing depend mainly upon the same source of payment, the earning capacity of the debtors. In all cases, it is important for the borrower to know exactly what rates he is obliged to pay and what other risks he is assuming. If there is necessity for supervision over one agency, there appears to be necessity for supervision over the others. In all cases the aims of supervision should be the same: fair terms, completely in the open, for both creditor and debtor; and for deception by either party penalties sufficient to restrain the unscrupulous minority, both among the lenders and among the borrowers.

AN EXAMPLE OF SUCCESSFUL SUPERVISION

The Uniform Small Loan Law, justified on the ground that the business of lending small sums to hard-pressed consumers is vested with a public interest, requires those who lend $300 or less, at more than the legal contract rate, to obtain licenses. The law, taking into account the fact that the borrower may be easily confused by disguised charges and involved legal provisions, provides that *all* charges, by whatever name they may be called, shall be stated as one rate, computed on unpaid balances. The law requires also that each borrower be furnished with an exact statement, in plain English, of the terms of the loan. The law, taking into account the further fact that harassed borrowers are often in no position to question charges, sets a limit on rates. The original recommended maximum rate was 3½ per cent a month. Today a majority of the states have a lower limit. The

law establishes supervisory authority in an administrative body, usually the state banking department, with power to refuse or revoke licenses, to request data on operations and, in a few states, to reduce maximum rates.

THREE NEEDS IN THE CASH LENDING FIELD

There are several urgent needs in the field of consumer credit:

1. The first need is workable laws, governing small cash loans, in those states which have no effective draft of the Uniform Small Loan Law. At present, half the states and the District of Columbia either ignore the problem, or have laws which in effect prohibit instead of regulate legal lending. This inevitably encourages illegal, sky-is-the-limit lending. In such states the lending goes on at a usual rate of 120 per cent to 240 per cent a year; but, in the under cover nature of the business, the statistics which are needed as a basis for sound legislation are not available.

2. A second need is better supervision in those states which have workable Small Loan Laws, but which have inadequate administrative machinery, personnel, and records.

The law provides merely the framework. How the business operates within the limitations of the bare requirements of the law depends on the energy and intelligence of the administrative body in charge. A state supervisor who has the power to require adequate reports and to investigate the licensees' books has at his command materials which reveal ways in which borrowers are being helped and ways in which they are not. With the cooperation of progressive lenders, the supervisor can work out socially-desirable regulations, close up loopholes, and put a stop to harmful practices. The capable supervisor does far more than gather figures and apprehend unlicensed lenders. He improves lending conditions to an extent beyond the expectations even of those who wrote the original law.

3. A third need, in some states, is effective supervision of such cash-lending agencies as pawnbrokers, industrial banks, personal loan departments of commercial banks, credit unions, and the lesser lenders, in order that borrowers may be informed fully and accurately regarding the costs of credit and the risks which they take. We need more data on the operations of these agencies, including clear and comparable statements as to interest rates and other charges, in order that reports of these agencies may have their part in the development of sound national financial policies. We should have, too, further studies of the needs of the borrowers, in order to determine to what extent each lending agency meets these needs. Most of the agencies which lend on preferred security and at rates lower than the maximum

permitted under the small loan act are not under effective public supervision. Only one state, New York, requires personal loan departments of commercial banks to confine their rates within limits computed on unpaid balances, but even New York does not require that borrowers be informed accurately as to the rates.

THE DEARTH OF ADEQUATE STATISTICS

How the gathering of adequate data may change our conceptions of what is going on is illustrated by the first comprehensive report on instalment financing—that for Indiana. Until recently, many of us have assumed that nearly all time sales, not financed by retailers, were serviced by sales finance companies. That assumption was basic to the use of the Department of Commerce Automobile Financing Series, covering some 450 organizations, as representatives of the entire automobile financing business. Recently, it has become evident that other types of financing agencies have entered the field; but how many there were or how important they were, we had no means of knowing. The Indiana report, as of the end of 1936, shows that in Indiana 256 state and national banks, Morris Plan companies, and small loan companies were engaged in time sales financing, as compared with 75 sales finance companies. Thus, in one of the 48 states, there were 347 agencies each with a volume of business large enough to warrant payment of the annual license fees.

The breakdown for the motor vehicle financing division is not complete, but what data there are appear to show that one-third of the volume in Indiana was handled by agencies other than sales finance companies. For the entire retail instalment financing business reported by licensees, 30 per cent of the volume and 35 per cent of the number of accounts were handled by banks, Morris Plan companies, small loan companies and miscellaneous companies. What we have learned from the two states which have undertaken supervision of instalment selling shows how much we might learn from adequate statistics of the whole business.

INSTALMENT SALES CREDIT

On the way up from the previous depression, instalment selling grew much faster than cash or charge account sales. Instalment sales credit outstanding is greater than that of any other division of consumer credit, with the exception of open charge accounts; and, with that one possible exception, instalment credit touches the lives of more individuals and more families than any other kind of credit. Yet, in spite of its enormous size and potentialities for good and evil, instalment selling and financing is not subject to the kinds of public supervision which are exercised over less important consumer credit agencies.

In the selling of merchandise, the trend has been away from the "public-be-damned" attitude, expressed in the ancient slogan, "Let the Buyer Beware." Today progressive retailers are committed to a new policy, not only in theory but also in practice. Even if the policy costs merchants millions of dollars a year in losses on returned goods, the policy pays, for the customer buys more freely if he knows that he can get credit or a cash refund for merchandise which does not satisfy him. This "Let the Merchant Beware" policy creates customer confidence.

But when it comes to selling credit, many of the credit agencies guarantee no such satisfaction. When the customer buys credit along with merchandise, often he buys a package of unknown contents. The commodity is sold on the "buyer beware" policy, but the buyer does not know what to beware of. If he finds later on that what he bought is not what he thought he bought, often he has no redress. He has committed himself to payments extending over a year, or two years, or even three; and once he has started, he cannot stop without suffering what is to him a large loss.

REGULATION NEEDED FOR INSTALMENT SALES

Conceivably, instalment sales agencies might regulate themselves, but they have not done so even to their own satisfaction. Abuses in this business are a grave concern to the reputable companies, which are a large majority of all the companies. Many of them, as reports of their own conventions show, would like to abandon the mulcting of consumers through reserves, bonuses and packs; but in the stress of competition they find it difficult to do the right thing. They denounce deception in rates of charge, yet every day in this respect thousands of dealers hoodwink their customers. In principle, the finance companies disapprove of contracts which fool buyers, yet their own representatives sometimes use such contracts. The reputable concerns would like to clear the business of the fringe of dealers who overcharge for insurance, and then in some cases do not bother to place the insurance, and dealers who repossess automobiles without notice, and then sell them at fake auction sales; yet these and other abuses persist.

Probably fewer than 15 per cent of instalment dealers are guilty of the worst frauds, yet the whole industry suffers because of the acts of the buccaneering minority.

Although the worst frauds are not common, concealment or misrepresentation of the true rate of charge on unpaid balances certainly is common. Each dealer is at liberty to state his rates in any way he pleases, and much ingenuity is shown in making the rates appear

lower than they are. A survey, conducted by authority of the General Court of Massachusetts, showed that the true annual rate in about 500 cases varied from 0 per cent to 943 per cent, and that in the majority of cases the rate was at least twice as high as the rate quoted by the seller. In 105 cases, the rate quoted by the dealer was 6 per cent; but in over nine-tenths of these cases the actual rate, computed on the average amount of credit extended, was above 10 per cent, and in one-third of the cases the rate was above 30 per cent.

The Massachusetts Committee on Consumer Credit concluded that, for the benefit of consumers and of the industry, the law should require a clear, uniform statement of total carrying charges, on a true interest rate basis, such as a per cent per month on actual, unpaid balances.

The gains which might be achieved by such a law are suggested by the success of the Uniform Small Loan Law. So well has the law achieved its purpose that in Massachusetts, where this type of law has been longest in effect, over 200,000 loans are made each year by licensed companies, with scarcely any violations of the law; and about fifty of the leading social welfare agencies, as well as the personal finance companies, have asked that no changes be made in the law.

How much better off the important instalment sales business would be, if it were so effectively supervised by the state that the social welfare agencies had virtually no frauds or deceptions to complain of.

Instead, state small loan supervisors are constantly requested to give relief from real or fancied instalment sales wrongs, despite the fact that they have no authority to deal with such cases. Of the 34 creditors each of whom had brought 50 or more wage executions against New York city employees, as of May 31, last year, 22 were jewelry, furniture, clothing and general merchandise stores. In Wisconsin, one of the two states that now has authority to supervise the instalment selling of automobiles, 860 complaints were filed in the first eighteen months against licensees engaged in the selling and financing of time sales, while in the same period, there was only one complaint filed against companies which were licensed under the Small Loan Law.

WHAT THE INSTALMENT BUYER SHOULD BE TOLD

In many cases, the instalment buyer does not know many things which he must know, if he is to buy intelligently and without regrets.

1. He does not know the price, in terms which enable him to compare the price with other credit packages in other credit markets. If the price is quoted as a per cent of something, the price seems simple

and definite; but if the buyer asks—as he usually does not ask—per cent of what?—frequently he gets no illuminating answer. If, on the other hand, the price is quoted in dollars and cents, the buyer has a useful measure, but not one which enables him easily to compare the price with the price of the same credit service elsewhere; for, since credit always covers a given amount of money for a given time, the only basis for comparing costs in different credit markets is a per cent of the dollars enjoyed for a unit of time, such as a per cent per month of the actual, unpaid balance.

"How much are credit potatoes today, Mr. Merchant?"

"They are $2.87, Mrs. Customer."

"For how much credit?"

"For enough to allow you to pay in ten equal instalments."

Since the bags of credit potatoes seldom contain the same number of pounds, the charges in dollars and cents do not readily reveal comparative rates.

2. Again, the customer does not know how long he will be allowed to lapse in payments before the merchandise will be repossessed or his wages garnisheed.

3. He does not know what repossession charge he will have to pay to get his merchandise back.

4. He does not know what penalty charge he will be assessed for late payment.

5. He does not know what refund, if any, he will be granted if he pays any of the instalments before they are due.

6. He does not know what legal fees may be charged against him.

7. He does not know what security he gives. If he assumes that repossession of his radio set terminates his obligation, he may assume wrongly; he may have given a lien on his automobile, or on his household furniture, or, without knowing it, he may have given a wage assignment.

8. He does not know what insurance is provided, even when he pays a special charge for insurance.

There are other things which—not always by any means, but often—the buyer does not know. Some are to be found in fine print in the legalistic language of the contract, but the buyer would have to hire a lawyer to tell him what they mean. If he discovers them at all, it may be after he has signed the contract.

Without the protection of strong instalment contracts, the seller or his assignees would be victimized by unscrupulous consumers, of whom there are enough to bankrupt careless credit-grantors. If the seller could not take swift, effective action against the "skip" and the "dead-

beat," there would be unbearable additions to his already high costs.

But a contract, implemented with strong legal weapons, all in the seller's favor, may be dangerous, as these examples show:

1. Wage assignments are used in sales to persons of meagre income or low credit rating, and in the sale of merchandise with no resale value, and the judicious use of these wage-assignments, in many states, is at the discretion of the seller.

2. Liens on merchandise other than the subject of the sale enable unscrupulous dealers to sell to persons of no credit standing, with the intention of making profits from the seizure of the buyers' property.

3. When a series of purchases are made over a long period of time, under an open-end contract, the buyer may find that, after he has paid enough to cover all costs on the furniture which was first covered by the contract, and on the washing machine which was bought under the same contract later on, he does not own either the furniture or the washing machine, because he has not paid in full for the baby carriage which was his latest purchase.

4. Occasionally, summary treatment in repossessing goods is justifiable, but in a few cases goods are repossessed at slight excuse, when only one or two payments remain to be paid, with loss to the purchaser of his entire equity. In one city about seventy automobiles a month are reported to the police as stolen, which have been repossessed without the knowledge of the purchaser.

5. Repossession and delinquency fees are kept within reasonable limits by better grade firms, but other firms—without the restraint of law or public supervision—charge all the traffic will bear.

6. The public sale of repossessed merchandise often is the best way of clearing up a hopelessly delinquent account, but many such sales are "fixed." A repossessed car which is worth $250 in the open market may be "sold" to a closed group of buyers for $150, and a court judgment secured against the instalment buyer for the balance due, plus various costs.

The scrupulous concerns, which, let us repeat, are a large majority of all concerns, rarely take advantage of the provisions of these one-sided contracts, except in dealing with dishonest or wholly unreasonable debtors; but these same harsh provisions can be used at any time by piratical dealers. In some states, the confession of judgment clause in the contract denies the buyer any opportunity to defend his case; the acceleration clause makes the entire amount due and payable, when a single payment is overdue; and the 15 per cent allowed for attorney's fees may be 15 per cent of the original unpaid balance, after most of that balance has been paid. More effective state supervision of instalment selling and financing is plainly needed.

RATE FIXING OF QUESTIONABLE BENEFIT

It is questionable, however, whether state regulation of charges is needed. No man, no commissioner, no banking department is wise enought to know what the rates ought to be in thousands of cases, each one of which involves risks and expenses different from all the others. Any rate which a state legislature would consider politically expedient would be too low to cover the necessary expenses of a large proportion of instalment sales. Small loans, repayable by means of many small payments, are necessarily expensive loans. Even a true annual rate of 90 per cent on a tire, which appears to be a common rate, with the balance payable in ten weekly instalments, is not necessarily an unwarranted rate. It does not necessarily guarantee any profit at all.

Naturally, when Utah fixed the maximum rate on automobile time sales at 8 per cent, no dealer in the state paid the slightest attention to the law; and when Wisconsin forbad dealers to charge an interest rate of more than 15 per cent, many dealers charged about what they would have charged anyway, but did not call it "interest." Futile for the same reason is the 6 per cent law now proposed for Rhode Island. The rates put into effect by the Indiana Commission are enforceable because they are so high that they enable most of the dealers to do business at a profit; but the rates were not set by the Legislature, and they can be changed at any time by the Commission.

NEED OF STUDYING BORROWING IN ITS EFFECT ON SPENDING HABITS

The effect of debt on family expenditures is another large, unexplored field for investigation. Spot studies of the purposes of borrowing are only a clue. To what extent do families incur debt for coal and clothing and instalment purchases which ultimately must be liquidated through money loans? To what extent do those who borrow to pay off accumulated debts assume new debts of the same sort, while they are liquidating their money loans? Answers to these questions await studies of individual families, extending over months and years of their debt-assuming and debt-liquidating experience. Studies as of one date are not enough. The Urban Study of Consumer Purchases, which covers the change in certain types of indebtedness through the transactions occurring in one year, is suggestive, but it suggests mainly avenues for further study.

These investigations would throw light not only on the effects on purchasing power in general, of saving and dissaving, and of borrowing and liquidation through prosperity and depression; they would provide also a basis for judging the effect of borrowing on the welfare of in-

dividual families. Nearly everyone can see the value to a family of a loan when the family is in a jam, or really has an unusual opportunity that requires ready cash. But we may question the advantage of borrowing, at the relatively high rates which must be charged for small, unsecured loans, if the borrower remains continually in debt. Since the chronic borrower shifts his obligations back and forth among various types of creditors, we can learn his behavior, not by studying one class of creditor, but by studying the borrower himself.

ADDITIONAL STATISTICAL STUDIES NEEDED

The fact that in most of the chief industrial states the personal finance business is in a mature stage is no excuse for complacence. The legal aid societies and social welfare agencies endorse small loan laws because they have brought about conditions markedly better than those that exist without such laws—not because they are perfect.

Consider, for example, the maximum rates. The reason for allowing a given rate on small loans is that it appears to cost at least that much to make them; but it does not follow that any rate, once adopted, is right for all time to come. The rate is a question of "how much," and quantitative measurement calls for scientific tools. It calls for market analysis to find out what classes of borrowers are served at any given rate, and what classes are left without any legal source of loans. It calls for the use of accounting technique in the analysis of financial statements, and for development of uniform accounting practices, in order that all states may have the advantage of rate experiments in any one state. Further, it calls for development of standards of comparison for gauging the adequacy of earnings. Is a 6 per cent rate of earnings on assets, used and useful in the business, about right? Or is 4 per cent right, or 8 per cent? How do the earnings of a cross section of lenders, big and small, compare with the earnings of other business groups, composed of large and small units? What is the cyclical variation in profits and what bearing has it on the proper rates of charge at one stage or another of the business cycle? Answers to such questions depend on scientific analysis, but first of all they require data, much of which will be made available only through public supervision of consumer credit. Until we have such supervision, future sleuths in this field will have to say, as Mr. Rolf Nugent recently said, "The job is one for a detective rather than for a statistician."

EXPENDITURE PATTERNS OF URBAN FAMILIES*

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The opportunity was afforded at a previous meeting of the American Statistical Association for explaining the objectives and sampling procedures of the Urban Study of Consumer Purchases.[1] The present report comes at a point in the study when data on family expenditures have been partially tabulated and permit some preliminary discussion of their implications. It is not within the scope of this paper to enter upon a detailed description nor general interpretation of the findings, which will have their place in appropriate government bulletins. Discussion of the findings will here be directed toward one phase of a selected problem—the graphic presentation of family expenditure patterns so that differences may readily be visualized between expenditures at different income levels and between different communities or samples of the community.

Before proceeding to an examination of the data here presented, it may be desirable to recall the general program of the study. The Study of Consumer Purchases is a joint effort by several departments of the federal government to ascertain the distribution of incomes among American families and the manner in which those incomes are disbursed. The Bureau of Home Economics of the Department of Agriculture has conducted the investigation among 80,000 town, village and farm families. The Bureau of Labor Statistics of the Department of Labor has been responsible for the study in urban communities. It has collected data on family incomes from more than 300,000 families scheduled in a random sample of thirty-two cities with populations varying, in degree of urbanization, from the metropolis to the community of around 15,000 inhabitants. From this random sample of urban families, a total of somewhat less than 25,000 families was selected for a detailed study of their family expenditures, the sample being controlled so as to permit the analysis of an approximately equal number of families within each of seven occupational divisions, from five to nine family types (depending upon the community), and a maximum of twenty income brackets. Expenditure schedules were secured only from native white families which contained both husband and wife (except in seven communities where negro families were

* Revision of a paper presented at a joint meeting of the American Statistical Association with Section K of the American Association for the Advancement of Science, Denver, Colorado, June 25, 1937. The assistance of Mr. A. C. Rosander, in the preparation of tabular materials, is gratefully acknowledged.

[1] "Methods and Problems of Sampling Presented by the Urban Study of Consumer Purchases," by Erika H. Schoenberg and Mildred Parten, this Journal Vol. 32 (June 1937), pp. 311–322.

separately scheduled). A corresponding portion of the random sample, likewise consisting of native white families with husband and wife, has been used for weighting the expenditure data by income, occupation and family type. The detailed expenditure schedules and check lists include information on the quantities purchased and amounts expended for specific commodities and services. The tables on specific commodities and their average prices have not yet been completed, but we do have summaries of expenditures by the main categories of goods and services for a number of cities in the study. The material used for illustrative purposes in the present paper is taken from two cities—Chicago and Denver.

Distribution of expenditures by income. The first line of analysis in any study of family expenditures would be expected to deal with the relation between income and expenditures. How does the distribution of family funds at the $2,000 income level differ from the manner in which the income of families at the $1,500 level is spent? Which categories of expenditure increase at a relative rate more rapid than the rise in the income level; which would increase more gradually than income? What would be the rate of increase of expenditure for a given item of family consumption, as the income is changed from one specified level to one which is ten per cent higher? These and similar questions find their answer as we establish the relationships existing between income and expenditures; occupation and expenditures; family type and expenditures. They have a place in marketing programs, in family budgeting, in estimating national consumption, in arriving at just wages scales, in efforts to keep production balanced with consumption—in a myriad of situations affecting private or public policy touching our national social and economic life.

The distribution of the expenditures of Chicago and Denver families, by income levels, is summarized in two accompanying tables. In Table 1, which covers the major categories of expenditure, the occupational groups have been combined; the income brackets included are those in which schedules for all occupations were taken in the controlled sample.[2] In Table 2, the percentages of total expenditures going to Food, Clothing and Personal Care are shown for two different occupational classes: wage earner and salaried executive. There the expenditures are included for income brackets below $1,250 in the case

[2] Families were not interviewed for expenditure schedules in the professional and executive business classifications at incomes below $1,250, nor in the wage earner and clerical classifications above $5,000. The total number of detailed expenditure schedules for the Chicago sample is 2,610. Of these, 64.1 per cent, comprising a sample of 2,223 families, are in the income bands between $1,250 and $5,000 for which all occupational groups were scheduled. The random sample of Chicago schedules, by which the expenditure data are weighted, included 28,510 families.

TABLE 1

AVERAGE EXPENDITURES AND PERCENTAGE DISTRIBUTION OF FAMILY MONEY EXPENSE FOR ALL OCCUPATIONS AND ALL FAMILY TYPES OF NATIVE WHITE NON-RELIEF FAMILIES, BY INCOME CLASSES, 1935–36

City and category of expenditure	Income class								
	$1250–1499	$1500–1749	$1750–1999	$2000–2249	$2250–2499	$2500–2999	$3000–3499	$3500–3999	$4000–4999
CHICAGO									
Total expenditure (100 per cent)	$1351	$1606	$1797	$1988	$2223	$2473	$2753	$3152	$3760
Percentage of total for:									
Food	39.0	36.5	34.4	33.0	34.4	31.7	31.3	29.9	28.1
Clothing	8.1	8.5	9.1	9.8	9.5	10.5	10.5	11.8	11.6
Housing, fuel, light, refrigeration	27.1	26.7	25.9	24.3	23.1	22.4	19.9	20.8	18.3
Other household operation	3.6	3.5	3.8	4.3	4.7	5.1	5.6	5.8	6.8
Furnishings, equipment	2.1	2.4	3.2	3.3	3.0	3.1	3.0	3.7	2.7
Automobile*	2.7	4.1	5.4	6.5	5.3	6.9	7.2	7.4	8.8
Other transportation	2.9	2.4	2.5	2.2	2.3	2.3	2.3	1.9	1.9
Personal care	2.1	2.2	2.0	2.1	2.3	2.2	2.1	2.2	2.1
Medical care	4.4	4.8	4.4	4.6	4.9	4.7	4.6	4.6	5.2
Recreation	2.2	2.2	2.6	2.8	3.1	3.2	4.0	3.3	3.8
Tobacco	2.2	2.4	2.1	2.0	2.1	2.1	2.2	2.0	1.9
Reading	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
Education	0.4	0.6	0.5	0.8	0.8	0.9	1.0	1.1	0.9
Gifts, taxes, etc.	1.8	2.0	2.4	2.8	2.8	3.3	4.6	4.2	6.6
Other items	0.2	0.6	0.6	0.4	0.6	0.5	0.6	0.3	0.3
DENVER									
Total expenditure (100 per cent)	$1384	$1591	$1739	$1969	$2068	$2362	—	—	—
Percentage of total for:									
Food	30.3	30.0	28.7	27.8	27.7	26.0	—	—	—
Clothing	9.8	10.4	10.2	10.6	11.3	11.8	—	—	—
Housing, fuel, light, refrigeration	21.7	20.8	22.4	19.5	19.6	19.3	—	—	—
Other household operation	4.0	3.9	4.4	4.8	4.6	4.8	—	—	—
Furnishings, equipment	3.4	3.6	4.1	5.0	3.3	3.5	—	—	—
Automobile*	10.3	10.6	9.9	11.8	12.0	12.8	—	—	—
Other transportation	1.5	1.9	1.4	1.6	1.6	1.7	—	—	—
Personal care	2.4	2.5	2.2	2.1	2.3	2.2	—	—	—
Medical care	6.7	6.8	6.2	5.6	5.3	5.1	—	—	—
Recreation	2.5	2.9	3.5	3.3	3.5	3.5	—	—	—
Tobacco	2.1	1.9	1.7	1.6	1.8	1.4	—	—	—
Reading	1.2	1.1	1.0	1.0	1.0	0.9	—	—	—
Education	0.8	0.5	0.7	0.8	1.1	1.2	—	—	—
Gifts, taxes, etc.	2.7	2.7	3.3	4.1	4.4	5.0	—	—	—
Other items	0.6	0.4	0.3	0.4	0.5	0.8	—	—	—

* Includes net expenditure of car bought as well as operating expenses.

of wage earners, and the income brackets above $5,000 for the salaried business classification.

A distinction may be noted between the samples of families shown in the tables and charts presented in this paper, and those treated in most previous studies of family living. Data on family expenditures have traditionally been confined to so-called working class families. Generalizations on the relative urgency of different items of expenditure at successive income levels—Engel's laws and their subsequent refinements—are consequently limited to income levels associated with wage earners and the lower clerical groups. The samples of families obtained by the Urban Study of Consumer Purchases differ from those of the working class studies in two important respects. First, the

families scheduled in the Urban Study include not only wage earners and clerical workers, but professional people, business executives and retired persons as well. Secondly, the annual family income extends from less than $500 to more than $10,000. It becomes a matter of particular interest, therefore, to see how far along the income scale the traditional concepts of necessities versus luxuries, and of relative degrees of urgency, may apply.

TABLE 2

EXPENDITURES FOR SPECIFIED ITEMS AS A PERCENTAGE OF TOTAL EXPENDITURE FOR FAMILIES OF WAGE EARNER AND SALARIED BUSINESS OCCUPATIONS (NATIVE WHITE NON-RELIEF FAMILIES) BY INCOME CLASSES, 1935-36

City and income class	Food		Clothing		Personal care	
	Wage earner families	Salaried business families	Wage earner families	Salaried business families	Wage earner families	Salaried business families
CHICAGO						
$500- 749*	41.9	—	5.6	—	2.2	—
750- 999*	39.5	—	7.8	—	2.0	—
1,000-1,249	40.8	—	7.6	—	2.1	—
1,250-1,499	40.5	34.5	7.8	7.6	1.9	2.4
1,500-1,749	37.3	34.3	8.7	8.4	2.1	2.5
1,750-1,999	34.9	33.1	8.9	8.8	2.0	2.0
2,000-2,249	33.9	32.7	10.1	9.3	2.0	2.2
2,250-2,499	35.5	32.5	8.9	10.3	2.1	2.4
2,500-2,999	33.1	31.5	9.6	10.0	2.1	2.3
3,000-3,499	34.0	29.2	11.5	10.0	2.2	2.3
3,500-3,999	33.8	27.7	11.0	10.6	2.3	2.1
4,000-4,999	28.8	26.0	12.4	12.6	2.2	1.8
5,000-7,499	—	24.4	—	12.0	—	2.1
7,500-9,999	—	21.2	—	12.0	—	2.2
10,000 and over	—	15.7	—	12.7	—	1.3
DENVER						
$500- 749*	39.4	—	6.3	—	2.1	—
750- 999*	36.8	—	8.2	—	2.2	—
1,000-1,249	36.0	—	8.9	—	2.5	—
1,250-1,499	30.0	30.2	9.0	10.4	2.2	2.7
1,500-1,749	31.1	29.7	10.7	14.2	2.5	2.3
1,750-1,999	30.4	28.2	9.9	10.3	2.3	2.2
2,000-2,249	26.8	26.9	11.0	10.7	2.1	2.2
2,250-2,499	31.2	25.9	11.7	12.9	2.5	2.0
2,500-2,999	29.7	24.9	9.8	11.6	2.2	2.2
3,000-3,499	—	24.8	—	12.8	—	2.2
3,500-3,999	—	20.8	—	12.5	—	2.3
4,000-4,999	—	23.3	—	14.1	—	2.3
5,000-7,499	—	20.8	—	12.4	—	2.3
7,500 and over	—	14.4	—	12.8	—	1.2

* For the income intervals between $500-1,000, the mean total expenditures exceeded the upper limit of the income interval, being as follows:

Income	Average total expenditures	
	Chicago	Denver
$500-749	$ 830	$748
750-999	1,021	894

The percentages shown would therefore be higher if on income rather than total expenditures.

A casual inspection of the expenditure tables will demonstrate that we may need to revise the traditional lines of demarcation between necessities and luxuries, for a sample that includes the upper income bands. Under the heading of food, for example, we have to reckon with more than the increase in adequacy of the diet. If the criterion of nourishment were the prevailing consideration, we should have that

sharp tapering off in food expenditures which was emphasized in the wage earner studies, after the requirements of hunger were met. Instead, we find that the percentage spent for food declines but gradually for incomes between $1,500 and $5,000. With increasing income, the food bill takes on the expenses of eating out and entertaining, as well as the introduction of delicacies into the food budget. Housing, including fuel, light and refrigeration, reflects a behavior pattern more in keeping with the familiar notion of a necessity that becomes relatively less crucial in the total income pattern as income rises. There is evidence that in large cities there may be a level of rent below which living accommodations cannot be had, so that there is little difference in housing costs, on a dollar basis, between the rents paid by families at $1,250 and those of families with $500 incomes. Clothing offers a contrast to food and housing, at least up to $5,000, in that it takes an increasing percentage of the total family budget. There are minor items like personal care, usually regarded as luxuries, which are nevertheless necessities in fact, showing a marked tendency to remain constant as a percentage of expenditures throughout the income range, at least to $10,000.

In comparing the proportions of different items of expenditures at successive income levels, it is important to note whether the base for computing the percentage distribution of expenditures is *total expenditures* or *total income*. Since savings and investments account for a progressively larger share of total income as income increases, the percentage spent on current consumption goods comes down rapidly as we approach the highest income brackets. Thus in the case of clothing, the percentage spent on that item may continue upward until the income bracket of $15,000 is reached, if total expenditures are taken as the base; but the percentage tends to decrease above $3,000 of income, if income is taken as the base.

Analysis of expenditures by linear regressions. A definitive summary of the original expenditure data per se must await completion of tabulations and, in particular, the analysis of specific commodities and services which enter into the summary categories of expenditures. The immediate objective at this point is to consider the utility of linear regressions for measuring and interpreting the patterns of family expenditures.

The pattern of expenditures for a given sample of the population may be delineated as a series of straight lines in a fan-shaped figure, in the form illustrated by Charts I and II. On these charts the average expenditures for the main categories of consumption are cumulated, layer on layer, until the position of the uppermost line represents the amount of total expenditure or total income, whichever is greater. If

CHART I

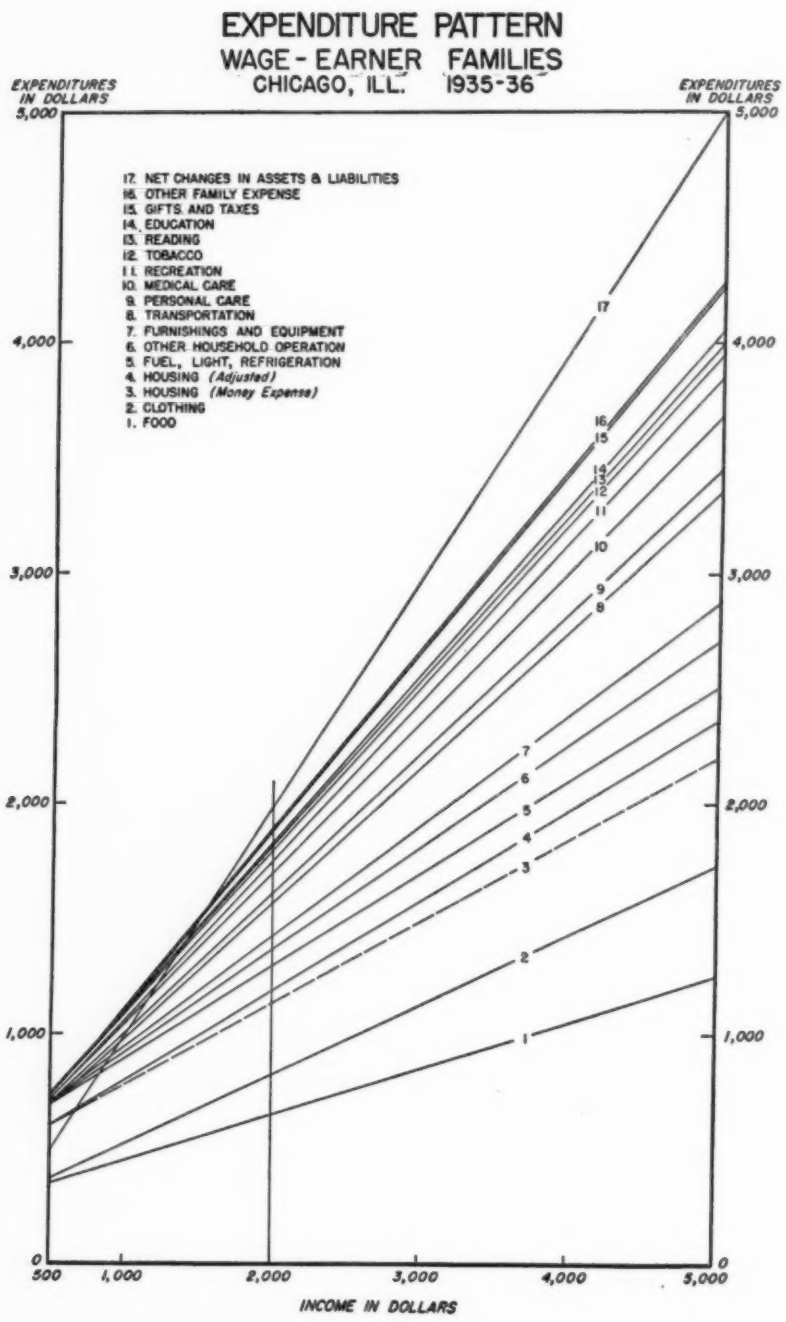

EXPENDITURE PATTERN
WAGE - EARNER FAMILIES
CHICAGO, ILL. 1935-36
EXPENDITURES IN DOLLARS
5,000
4,000
3,000
2,000
1,000
0
17. NET CHANGES IN ASSETS & LIABILITIES
16. OTHER FAMILY EXPENSE
15. GIFTS AND TAXES
14. EDUCATION
13. READING
12. TOBACCO
11. RECREATION
10. MEDICAL CARE
9. PERSONAL CARE
8. TRANSPORTATION
7. FURNISHINGS AND EQUIPMENT
6. OTHER HOUSEHOLD OPERATION
5. FUEL, LIGHT, REFRIGERATION
4. HOUSING (Adjusted)
3. HOUSING (Money Expense)
2. CLOTHING
1. FOOD
500
1,000
2,000
3,000
4,000
5,000
INCOME IN DOLLARS

CHART II

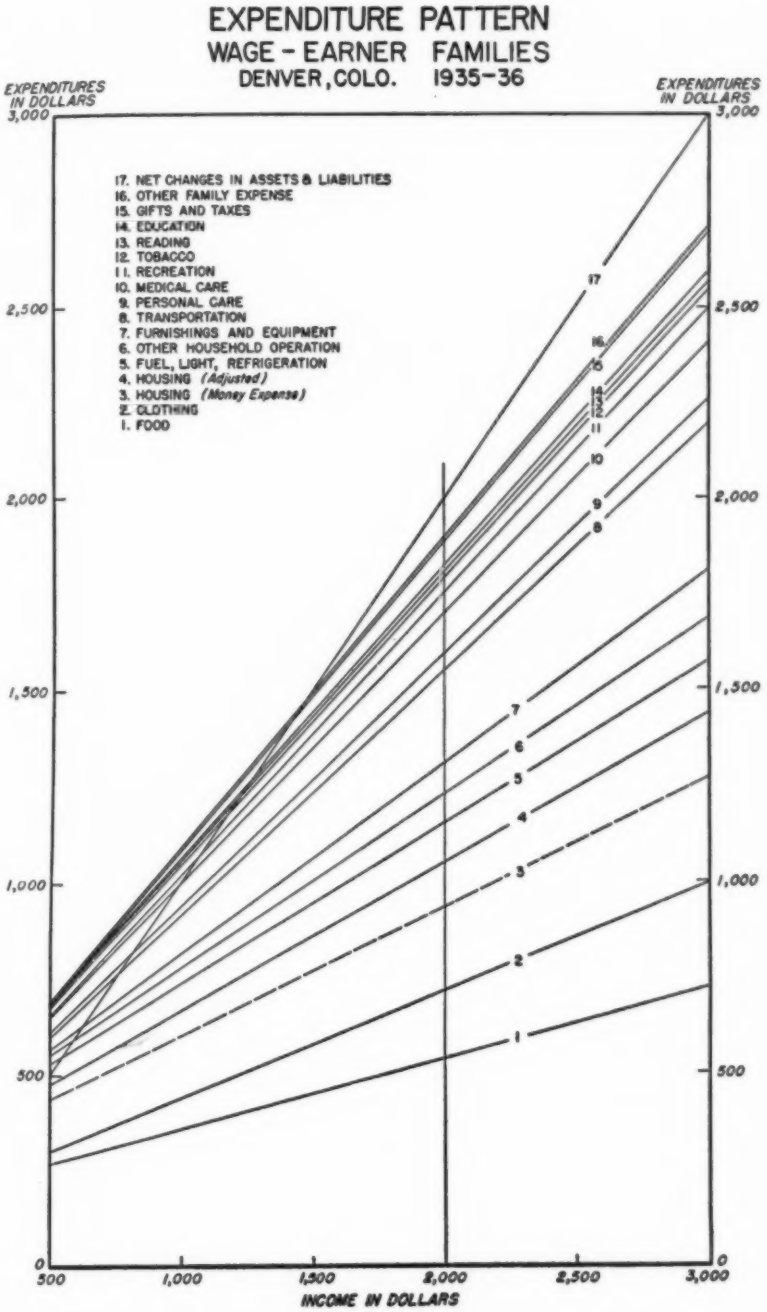

EXPENDITURE PATTERN
WAGE - EARNER FAMILIES
DENVER, COLO. 1935-36
EXPENDITURES IN DOLLARS
EXPENDITURES IN DOLLARS
17. NET CHANGES IN ASSETS & LIABILITIES
16. OTHER FAMILY EXPENSE
15. GIFTS AND TAXES
14. EDUCATION
13. READING
12. TOBACCO
11. RECREATION
10. MEDICAL CARE
9. PERSONAL CARE
8. TRANSPORTATION
7. FURNISHINGS AND EQUIPMENT
6. OTHER HOUSEHOLD OPERATION
5. FUEL, LIGHT, REFRIGERATION
4. HOUSING (Adjusted)
3. HOUSING (Money Expense)
2. CLOTHING
1. FOOD
3,000
2,500
2,000
1,500
1,000
500
0
500
1,000
1,500
2,000
2,500
3,000
INCOME IN DOLLARS

CHART III

EXPENDITURE PATTERN EXTENDED TO ZERO INCOME

WAGE-EARNER FAMILIES

CHICAGO, ILL. 1935-36

CHART IV

EXPENDITURE PATTERN EXTENDED TO ZERO INCOME

WAGE EARNER FAMILIES

DENVER, COLO. 1935-36

a vertical line is run up from the x axis, as is done in the illustrations at the $2,000 income point, it will cut each of the layers so that the distances along the vertical line will measure the amount expended for the item of consumption included within the segment at that income level. We thus have at a glance the average expenditures for the main categories of consumption, distributed within the total income at any desired income level. The values are obtained from linear regressions applied to the original data. Such a linear representation of expenditures, which has been used with more limited samples by Allen and Bowley,[3] reduces to a simple configuration the cumulative pattern of expenditure by consumption categories across the income range. It may serve, as will be later explained, to show not only the average amount of expenditures at a given level but also, by the slope of each line with respect to the one below it, the relative urgency and elasticity of expenditure for the different items. A reduction of the data to a conventional pattern of this type should be valuable, if valid, for ready comparison of the general expenditure patterns of different communities, occupations and family types. Let us now turn to consideration of the individual regression lines which make up this cumulative pattern.

The question which will naturally arise is whether we are justified in applying linear regressions uniformly to items of expenditure which may undergo varying changes in emphasis from one income level to another. If we take "necessity" items, will there not be a tendency for the expenditures to approach an asymptote at the high income levels? And in the case of luxuries, should we not expect the slope of the expenditure curve to become steeper as it reaches the income levels at which the desire for luxuries may be better satisfied? We need not argue the point that it would be undiscriminating to apply a uniform curve, much less a linear regression, to expenditures for specific items like bread and artichokes, overalls and swallow-tails, pots and portraits. But there is nevertheless the possibility of utilizing linear regressions for general classes of expenditures, as distinguished from the specific items purchased, and for presenting cumulative patterns of expenditure, as distinguished from the detailed examination of an isolated regression. The fit of the linear regression has been tested for each of the categories of expenditure shown in the charts of the cumulative expenditure patterns. The regression lines of four of these individual categories have been selected to illustrate some of the characteristic findings and may be examined separately by reference to Charts V, VI and VII.

[3] Allen and Bowley, *Family Expenditure: A Study of Its Variations*, London, 1935.

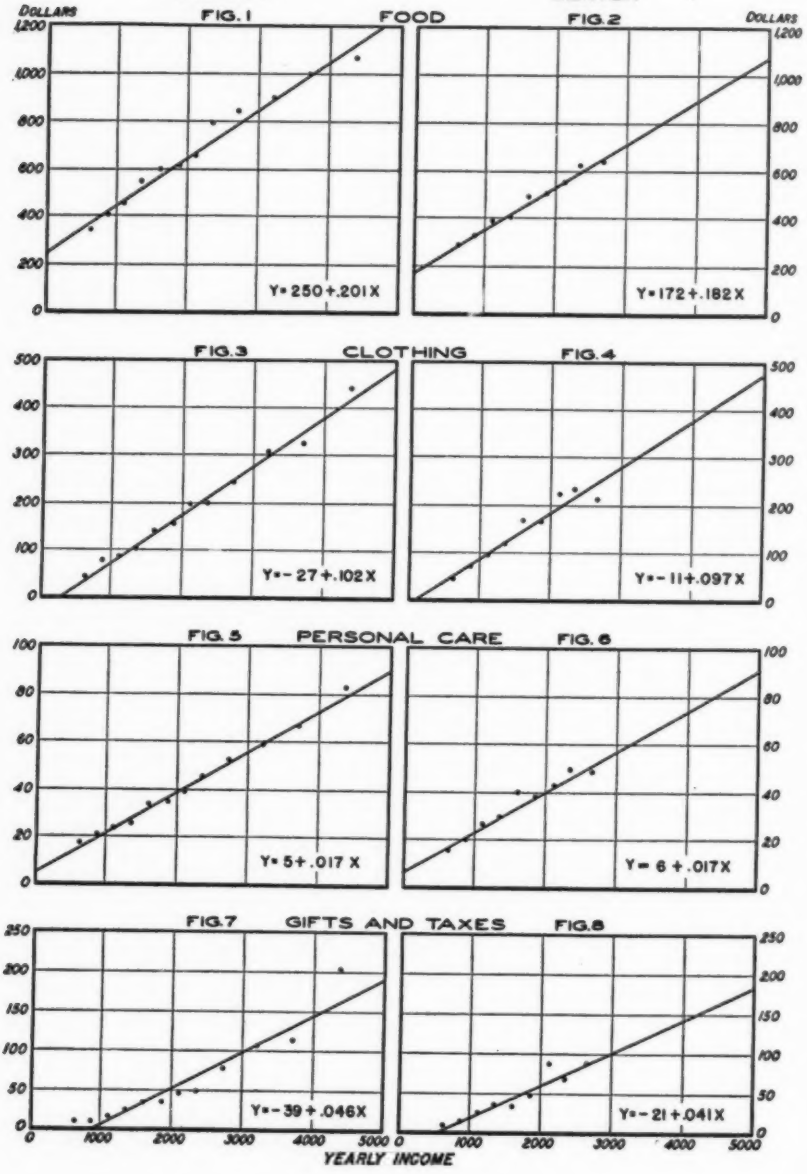
Regression equations were also applied by William F. Ogburn at an earlier date for correlating the per cent of income spent on a given item to the total income. See "Analysis of the Standard of Living in the District of Columbia in 1916," this JOURNAL, Vol. 16 (June 1919), pp. 374–389.

CHART V

STRAIGHT LINE FITTED TO AVERAGE EXPENDITURES IN RELATION TO FAMILY INCOME

WAGE EARNER FAMILIES OF —

CHICAGO DENVER



At the top of Chart V are plotted the average amounts of food expenditures at successive income levels for wage earner families in Chicago (upper left) and for the wage earner families in Denver (upper right). The data for the Chicago wage earner incomes run to $5,000, while those for Denver wage earners stop at $3,000. In the case of the Chicago families, it may be noted that at the upper end of the scale—above $2,500—the slope of the plotted points is somewhat less steep than it is for the points below $2,500. Between $1,250 and $2,000 there appears to be something of an intermediate plateau. In Denver, where wage levels generally run lower, there is little to choose, as to slope, between the upper and lower halves of the scale. Undoubtedly a factor in causing the plotted points to depart from the regular curve is the random fluctuation to be expected when we limit ourselves to a sample of approximately thirty families per income band (combining different family types) within the given occupation. It also appears likely that instead of a regular outline up the income scale, be it linear or non-linear, we shall find after closer study of the families scheduled that the discontinuity of the outline represents a significant "terracing" of expenditure, with a given plateau spreading over several income bands. In part these terraces may reflect a certain degree of social stratification within the span of two or more income intervals. Or a new plateau may be due to changes in the family type pattern, such as the increase, with given income level, of adult families containing supplementary earners.[4]

We meet with another situation which affects the utility of the linear regression, in the case of food expenditures plotted for the families of salaried business executives (Charts VI and VII). In their case, families are included with incomes from $5,000 up. Taking the food curve for Chicago, it is apparent that we should get a very much better regression line if we stopped at the $5,000 mark; we might possibly justify including families in the $7,500 to $10,000 income bracket. But the inclusion of the point for average expenditure of families having from $10,000 upward imposes a severe downward influence upon the slope—sufficient to double the reading for the line at the intercept and materially to increase the impression of rigidity over the whole range of food expenditures. The extent of the change in slope for food expenditure due to the inclusion of the uppermost income bracket is shown by the broken line which takes in only the plotted points up to $8,500. In the case of the salaried business families for Denver, where the mean income figure for the highest income group

[4] Linear regressions for expenditure patterns with family type as a control were not completed in time for inclusion in the present paper.

CHART VI

STRAIGHT LINE FITTED TO AVERAGE EXPENDITURES IN RELATION TO FAMILY INCOME

SALARIED BUSINESS FAMILIES OF CHICAGO

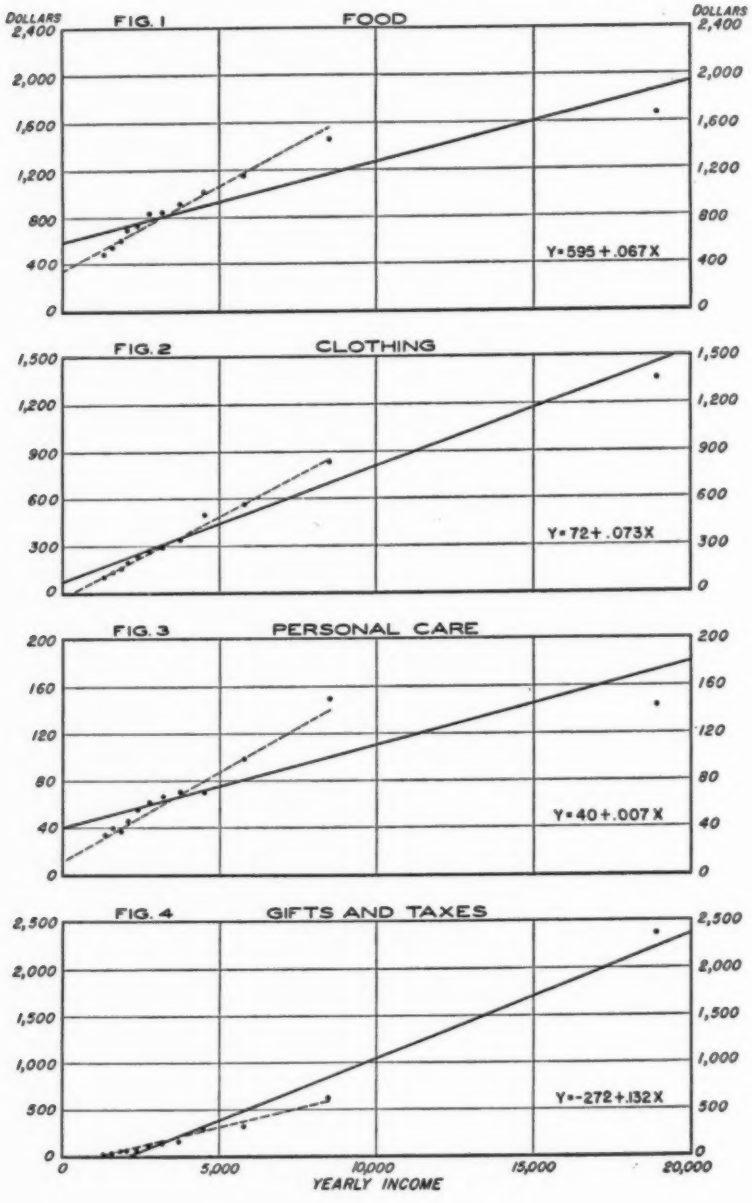


CHART VII

STRAIGHT LINE FITTED TO AVERAGE EXPENDITURES IN RELATION TO FAMILY INCOME

SALARIED BUSINESS FAMILIES OF DENVER

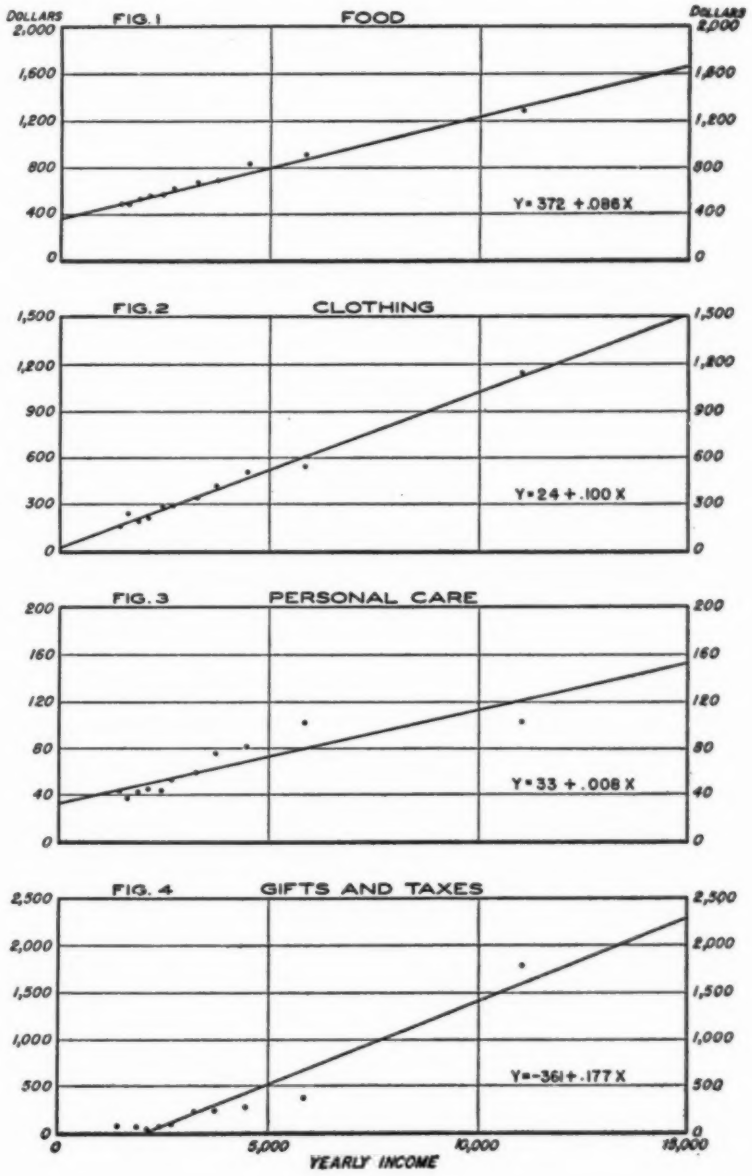


TABLE 3

EVALUATION OF LINEAR REGRESSION BY OCCUPATION—CHICAGO AND DENVER

y = linear plot *n* = non-linear plot *c* = linearity low but no evidence of non-linearity *b* = good (or better) linear fit if highest income group is eliminated

Expenditure category	Salaried professional families		Salaried business families		Independent professional families	Independent professional and business families	Independent business families	Clerical families		Wage earner families		Totals		
	Chicago	Denver	Chicago	Denver	Chicago	Denver	Chicago	Chicago	Denver	Chicago	Denver	*y*+*c*	*n*	*b* only
Food	*n*	*nb*	*nb*	*y*	*n*	*yb*	*y*	*y*	*y*	*y*	*y*	7	4	0
Clothing	*y*	*yb*	*b*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	10	0	1
Housing (adjusted)	*y*	*y*	*b*	*y*	*y*	*y*	*b*	*y*	*y*	*c*	*y*	9	0	2
Fuel, light, refrigeration	*y*	*n*	*y*	*y*	*y*	*n*	*b*	*c*	*y*	*y*	*y*	8	2	1
Other household operation	*y*	*y*	*b*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	10	0	1
Furnishings, equipment	*n*	*c*	*y*	*nb*	*y*	*y*	*n*	*y*	*n*	*yb*	*y*	7	4	0
Transportation	*y*	*y*	*nb*	*nb*	*y*	*n*	*y*	*y*	*y*	*y*	*y*	8	3	0
Personal care	*y*	*c*	*b*	*yb*	*y*	*y*	*n*	*y*	*y*	*y*	*y*	9	1	1
Medical care	*c*	*c*	*c*	*c*	*c*	*y*	*y*	*y*	*c*	*y*	*c*	11	0	0
Recreation	*y*	*y*	*b*	*y*	*y*	*y*	*y*	*y*	*n*	*y*	*y*	9	1	1
Tobacco	*y*	*c**	*b*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	*y*	10	0	1
Reading	*y*	*y*	*b*	*yb*	*n*	*c*	*b*	*y*	*y*	*y*	*c*	8	1	2
Education	*c*	*n*	*y*	*y*	*y*	*n*	*n*	*y*	*n*	*n*	*y*	6	5	0
Gifts and taxes	*y*	*y*	*n*	*n*	*n*	*n*	*n*	*n*	*n*	*n*	*y*	3	8	0
Savings	*y*	*n*	*n*	*yb*	*y*	*n*	*n*	*y*	*n*	*y*	*n*	5	6	0
Totals *y*+*c*	13	11	4	12	12	10	7	14	10	13	14	120	—	—
n	2	4	4	3	3	5	5	1	5	2	1	—	35	—
b (only)	0	0	7	0	0	0	3	0	0	0	0	—	—	10

* Slight negative correlation.

In general, linear correlations below .80 were classified as "*c*," but several above .80 with a relatively high standard of error were also classified as "*c*." In Denver, medical care for salaried business was so designated even though *r* was .86 (*S* = 48). In Chicago, housing for wage earners had a linear correlation coefficient of .80 but *S* was 42.

The linear correlation coefficient might be very high (.95 for example) even when the points were clearly non-linear, due to the range of the data. Hence the magnitude of this coefficient was no index of the proper fit. In a few cases a linear equation fits the data very well, but a non-linear equation would have been slightly better.

For Chicago salaried business families, all the regressions classified as "*b*" were clearly linear except for the last point ($19,000 income) which often gave an expenditure less than that expected on the basis of linearity.

is less than $11,000, the effect of including the last point is decidedly less serious. Nevertheless, a steeper slope and a better fit are produced by limiting the incomes to $5,000 (Figure 1, Charts VI and VII).

Turning to the figures on clothing for wage earner families, more than half of the points are virtually on the regression line for both cities (Figures 3 and 4, Chart V). The points that deviate may be assumed to do so because of random fluctuations, since the deviations are slight and not uniformly distributed. For the wider income span given to the salaried business families, clothing follows a linear rather than a non-linear outline up to the $10,000 income band Figure 2, Chart VI). The inclusion of the highest income bracket for Chicago reduces the slope for the Chicago sample, as compared with the one for Denver.

In respect to personal care, the wage earner expenditures seem to be better suited to linear regression than to a non-linear curve, although here again the terracing previously referred to is quite apparent, seeming to go in pairs of income bands. With salaried business families, both for Chicago and Denver, we get a fluctuating pattern (Figure 3 in Charts VI and VII). In the case of Chicago, a peak is reached with the $7,500 to $10,000 group; and in the case of Denver, it is reached with the $5,000 to $7,500 group. The inclusion of the top brackets is here obviously impracticable with linear regressions. The business and professional families do not exhibit the regularity in the stepping up of expenditures with income that is found in the case of wage earner and clerical families, or that is obtained when all occupational groups are combined.

As a last illustration, attention is directed to the figures for gifts and taxes (Figure 4 in Charts VI and VII). Here, regardless of occupation, the pattern is one with almost zero slope for the lower income brackets, stepping up very sharply with increase in income. Obviously a curve which emerges slowly from the horizontal, and increases the slope sharply with the rise in income above $3,000, will be the only type with which to describe appropriately the item of gifts and taxes.

After inspection of the regression lines obtained from the plotting of the separate items for each of the occupational groups in the Chicago and Denver samples, a classification of their applicability to linear regressions has been worked out, as shown in Table 3. It will be noted that of the 165 separate regressions plotted, 120 were clearly linear or revealed no definite curvilinear trend; 10 examples indicated the feasibility of linear representation if the last point were omitted; while 35 were apparently curvilinear. This is to say that 73 per cent were linear, 6 per cent were linear except for the last income point, and 21 per cent indicated non-linearity.

Urgency of expenditure, intercept value. In their use of linear regressions, Allen and Bowley have laid emphasis on the magnitude and sign of the value obtained at the intercept, representing expenditure at zero income. Using the y axis for expenditures and the x axis for income, the line of regression for the expenditure on a given item would take the form $y=a+bx$, where a is the constant term for expenditure at the intercept, and b the constant for the slope of the line. If in this

TABLE 4
SCALE OF URGENCY OF EXPENDITURE CATEGORIES

CHICAGO		DENVER	
Wage Earner	Salaried busines	Wage earner	Salaried business
1. Food	Food	Food	Food
2. Housing (money exp.)	Housing (adjusted)	Housing (adjusted)	Housing (adjusted)
3. Housing (adjusted)	Housing (money exp.)	Housing (money exp.)	Housing (money exp.)
4. Fuel, light, refrigeration	Transportation	Fuel, light, refrigeration	Fuel, light, refrigeration
5. Reading	Medical care	Medical care	Medical care
6. Personal care	Clothing	Tobacco	Personal care
7. Tobacco	Fuel, light, refrigeration	Reading*	Tobacco
8. Furnishings, equipment	Recreation	Personal care*	Clothing
9. Medical care	Tobacco	Other household operation	Reading
10. Other household operation	Personal care	Education	Education
11. Education	Other household operation	Furnishings, equipment	Recreation
12. Recreation	Reading*	Clothing	Other household operation
13. Clothing	Furnishings, equipment	Recreation	Transportation
14. Gifts and taxes	Education	Gifts and taxes	Furnishings, equipment
15. Transportation	Gifts and taxes	Transportation	Savings
16. Savings	Savings	Savings	Gifts and taxes

* Tied ranks.

expression the amount obtained for a is positive, the expenditure item is assumed to rank as a necessity, the degree of urgency depending upon the magnitude of the a value. If the value of a is negative, the item is assumed to have the character of what under Engel's law would be deemed a luxury. The constant term b, representing the slope of the line, when taken in conjunction with a, determines the elasticity of the expenditure for the item at a selected income level. For a given value of b, we shall have greater rigidity in the expenditure if a is high and positive; conversely, we shall have a high elasticity of expenditure if a is decidedly negative.[5] On that basis, a scale of urgency

[5] While a detailed discussion of the concept of elasticity of expenditure would carry beyond the practicable limits of the present paper, it may be noted here that elasticity of expenditure for any

is built up, ranging from the highest positive intercept value—such as we should get for food—to the largest corresponding minus quantity —such as we should get if we attempted a linear regression for expenditures on gifts and taxes. By applying this type of yardstick to the data used for illustration, we get an order of urgency for wage earner and salaried business families, as shown in Table 4. In Tables 5 and 6 are given the computed values for the intercept a, the constant term b representing the slope, and the value derived for

TABLE 5

LINEAR REGRESSION CONSTANTS FOR EXPENDITURES BY INCOME FOR WAGE EARNER AND SALARIED BUSINESS FAMILIES: CHICAGO

Expenditure category	Wage earner families			Salaried business families		
	Intercept A	Slope B	Expenditure elasticity at the mean	Intercept A	Slope B	Expenditure elasticity at the mean
Food	$249	.201	.636	$595	.067	.347
Clothing	− 27	.102	1.140	72	.073	.827
Housing (money expense)	207	.050	.344	305	.073	.532
Housing (adjusted)	186	.087	.503	315	.086	.562
Fuel, light, refrigeration	74	.018	.350	65	.010	.410
Other household operation	− 9	.040	1.116	30	.049	.884
Furnishings, equipment	− 5	.033	1.075	21	.016	.782
Transportation	− 70	.112	1.402	93	.058	.748
Personal care	5	.017	.884	40	.007	.444
Medical care	− 6	.048	1.064	91	.010	.350
Recreation	− 23	.038	1.386	50	.021	.663
Tobacco	4	.019	.908	44	.004	.318
Reading	7	.006	.658	21	.003	.426
Education	− 11	.013	1.624	− 2	.010	1.048
Gifts and taxes	− 39	.046	1.648	− 272	.132	1.776
Savings	−337	.216	3.549	−1155	.449	2.197
Total expenditure	357	.747	.820	1145	.538	.717

elasticity of expenditure (η) at the mean income. In the case of food for Chicago wage earners, to take an illustration, the expenditure value

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item, taken at a given income, is the ratio of the per cent increase in expenditure to the per cent increase in income. Expressed as an equation, the elasticity of expenditure

$$\eta = \frac{\Delta e/e}{\Delta i/i} = \frac{\Delta e}{\Delta i} \cdot \frac{i}{e} = \frac{b}{p}$$

where i is the income

Δi is the increase in income

e is the expenditure corresponding to i

Δe is the increase in expenditure corresponding to Δi.

The term $\Delta e/\Delta i$ is the slope of the linear regression line, usually written b; while $i/e = 1/p$ since $e/i = p$, the percentage which the expenditure is of the corresponding income.

Relationship between a, the intercept; b, the slope; and p, the percentage expenditure is of income:

If $y = a + bx$, then $p = (a/x) + b$. From the fact that $\eta = b/p$ we derive $\eta = bx/(a + bx)$. This equation shows that when a is positive, (1), η is less than 1; when a is zero, (2), η is equal to 1; and when a is negative, (3), η is greater than 1. (For this latter condition bx must be greater than a; and b is assumed throughout to be positive—which represents the usual situation.)

at any given income is $249.50 plus 20.1 per cent of the income (Figure 1, Chart V).

Interpretation of cumulative linear pattern. To return to our cumulative expenditure Charts I and II, we may now view these as total expenditure patterns built up by the use of linear regressions computed (as in Tables 5 and 6) from the data for the various categories of consumption. Several of these lines approach, or may cross, the lines marking the items immediately below them, before reaching the lowest income point. This is equivalent to their having a negative intercept

TABLE 6

LINEAR REGRESSION CONSTANTS FOR EXPENDITURES BY INCOME FOR WAGE EARNER AND SALARIED BUSINESS FAMILIES: DENVER

Expenditure category	Wage earner families			Salaried business families		
	Intercept A	Slope B	Expenditure elasticity at the mean	Intercept A	Slope B	Expenditure elasticity at the mean
Food	$172	.182	.633	$372	.086	.461
Clothing	− 11	.097	1.072	24	.100	.939
Housing (money expense)	111	.054	.440	253	.037	.348
Housing (adjusted)	116	.107	.600	257	.085	.549
Fuel, light, refrigeration	41	.033	.563	92	.017	.405
Other household operation	1	.037	.990	− 38	.061	1.205
Furnishings, equipment	− 10	.045	1.156	− 57	.048	1.478
Transportation	− 33	.138	1.172	− 39	.124	1.094
Personal care	6	.017	.816	33	.008	.466
Medical care	15	.045	.826	69	.031	.621
Recreation	− 13	.036	1.278	−28	.046	1.203
Tobacco	12	.010	.563	31	.003	.273
Reading	6	.005	.559	11	.004	.578
Education	− 6	.011	1.511	− 16	.014	1.410
Gifts and taxes	− 21	.041	1.467	−361	.177	2.243
Savings	−277	.192	8.596	−352	.190	2.011
Total expenditure	272	.755	.819	348	.762	.890

value. It means that the items which thus cease to have a definite slice of the expenditure total would be classified in the non-urgent group of expenditures, having a high degree of "Engelian elasticity." In order that these regression lines at very low incomes may be more readily traced to their respective intercepts, they are shown with the scale for the x and y axes exaggerated, in Charts III and IV, "Patterns Extended to the Zero Income;" the last six minor categories of the cumulative Charts I and II are also combined in III and IV to clarify the picture. The broken lines represent the extrapolation from the lowest incomes actually scheduled, to zero income. It will be noted that the total income line (marked 17) runs through the area of ex-

penditures as it gets into the lowest incomes, indicating the excess of expenditures over current income at those levels of income.

Some of the applications which we make of these cumulative patterns, for a comparison of family expenditures by income, are apparent. Comparing the wage earner families of Chicago and Denver (Charts III and IV), for example, we may see that food has taken a larger percentage of total income from the low income families in Chicago than it has from those in Denver. Housing, likewise, is shown to require more of the low family income in Chicago than in Denver. Indeed, food plus housing appear as alone sufficient to produce a net deficit for Chicago wage earner families with incomes between $500 and $750, while for the Denver wage earner families, the regressions at $500 to $750 income allow for food, housing, and clothing, with a little to spare. The clothing expenditures in the Chicago pattern are seen to be substantially less for the wage earner families of low income than they are in Denver. These primary elements in the total expenditure pattern immediately account for the higher money wages required by Chicago families than by Denver families. Transportation, in part reflecting the ownership of an automobile, is relatively as important as clothing in its claim in the family budget in Denver, but less conspicuous in Chicago. It will be seen how the other items in the family budget, notably household operations, medical care, and recreation, tend to approach zero expenditures at the low income levels for Chicago wage earners, causing the regression lines to cross or blend into each other from $1,000 down. For both Chicago and Denver, however, clothing takes on the pattern of an item with luxury characteristics, showing a negative intercept in both cities at zero income.[6] Personal care holds its place as a necessity among the families in both Chicago and Denver, although the item is not a large one. Another interesting feature among the minor items is the continuance of reading as a positive item in the budget almost to the intercept. In the case of the wage earner families it actually has a positive value at zero income.[7]

[6] On the charts for the salaried business families, for which space is not available in this paper, a number of items show the characteristic of necessities, at the intercept, which appear as luxuries in the wage earner charts. Thus clothing has a positive intercept for the salaried business families in both cities, whereas the intercepts were negative for the wage earner group. Because of the larger incomes that prevail, the investment in owned homes (*housing adjusted*, on the charts) remains a positive item at the intercept for the salaried business families.

[7] On the cumulative expenditure charts the area between the regression line labelled "net change in assets and liabilities" (shown as 17), and the line of total expenditure, represents the difference between the current year's expenditures for consumption goods and the current net income. Increases in assets and decreases in liabilities tend to give this net-change item a positive value; decreases in assets and increases in liabilities tend to make it negative. Life insurance premiums and other additions to savings, as well as repayments of debts, represent disbursements which increase assets. Unpaid bills,

Conclusion. A few tentative conclusions may be drawn from the experimentations done thus far, regarding the practicability of linear regressions for use in the measurement of family expenditures. Although the straight line is inapplicable to many specific items of consumption, it is useful in highlighting the behavior of the main categories of expenditure. This seems to be true in general, even though among the groups of expenditures there are individual cases which deviate from the regression line to an extent that renders them unamenable to linear representation.

The linear regression appears to be especially promising in the construction of cumulative expenditure patterns, permitting broad comparisons between different categories of expenditure within a given universe and between the total expenditures of different universes. Extrapolation of the regression lines for incomes beyond the main body of the data is not feasible. Above $5,000 of income, the slope of the line is subject to serious distortion because of the excessive influence of the few families which set the average for the extremely high incomes. Bearing these limitations in mind, the linear regression may serve as a convenient guide in rating expenditures on the basis of urgency, as well as in the comparison of one sample with another. Its relative simplicity commends it for rough approximations even though it is found necessary to apply other curves which will better fit the characteristics of specific items of expenditure.

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and dipping into savings for expenditures beyond current income, would bring down the values for the net-change line. Special note should be taken of the fact that the schedules were taken in 1936—a year of recovery, in which some of the vacuum left by depression years in purchases of durable consumption goods was filled in with forward buying, on installment accounts. This forward buying increases the apparent family deficit in the expenditure pattern shown, which is for the year 1936. The total amount of an installment purchase made during the year was charged to the family, even though payments might not be due until after the schedule year. Inasmuch as the paying off on installment accounts incurred in previous years was not as great as the forward buying, a net deficit is shown by the regression line at relatively high income levels; this may be taken to reflect optimism as to the future, rather than insolvency on the part of the families in the sample.

CONTRIBUTION TO THE THEORY OF SAMPLING HUMAN POPULATIONS

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1. INTRODUCTION

At a Conference on Sampling Human Populations held last April at the Department of Agriculture Graduate School in Washington, a problem was presented by Mr. Milton Friedman and Dr. Sidney Wilcox for which I could not offer a solution at the time. Since it seemed to be important and of general interest, I have considered it in some detail. The purpose of this paper is to present the results I have obtained.

2. STATEMENT OF THE PROBLEM

I shall start by describing the problem in much the same form as it was stated to me, without using any mathematical symbols. Then I shall formulate it in mathematical terms. The reader who does not wish to follow the mathematical processes may skip from equation (8) to the results and examples beginning with equation (52) on page 111.

A field survey is to be undertaken to determine the average value of some character of a population, for example, the amount of money which families spend for food in a population of families residing in a certain district. The collection of these data requires long interviews by specially trained enumerators and, hence, the cost per family is quite high. Since the total cost of the survey must be held within the amount appropriated for it, the data must be secured from a small sample of the population. In view of the great variability of the character, the sample appears to be too small to yield an estimate of the desired degree of accuracy.

Now the character is correlated with a second character which can be determined much more readily and at a low cost per family. Since a very accurate estimate of the second character can be secured at relatively small expense, and since for any given value of it, the variation of the original character will be smaller than it is in the whole population, a more accurate estimate of the original character may be obtained for the same total expenditure by arranging the sampling of the population in two steps. The first step is to secure data, for the second character only, from a relatively large random sample of the population in order to obtain an accurate estimate of the distribution of this character. The second step is to divide this sample, as in

stratified sampling, into classes or strata according to the value of the second character and to draw at random from each of the strata a small sample for the costly intensive interviewing necessary to secure data regarding the first character.

An estimate of the first character based on these samples may be more accurate than one based on an equally expensive sample drawn at random without stratification. The question is to determine for a given expenditure, the sizes of the initial sample and the subsequent samples which yield the most accurate estimate of the first character.

Let us now enter into the details and introduce the necessary notation. Denote by π the population studied and by X the character of its individuals the average of which, say $\overline{X}$, is to be estimated. This is the character the collection of data on which is costly. Next let Y denote the second character, on which the collection of data is cheap, and which is assumed to be correlated with X. The range of variation of Y in π being more or less known, we shall divide it into s intervals, say

(1) from Y_0 to Y_1, from Y_1 to Y_2, $\cdots$, and from Y_{s-1} to Y_s.

Denote by π_i the part of the population π composed of the individuals for which

$$(2) \qquad Y_{i-1} \leqq Y < Y_i \qquad (i = 1, 2, \cdots, s);$$

π_i will be called the ith stratum of the population π. Denote further by

$$(3) \qquad p_1, p_2, \cdots, p_s$$

the proportions of the individuals of π belonging to the strata π_1, π_2, $\cdots$, π_s respectively.

In the following we shall have to consider three different processes of sampling which it is important to distinguish. The first two form the method described by Mr. Friedman and Dr. Wilcox, which I shall further describe as the method of double sampling. The third will serve as a standard of comparison of the accuracy of the method of double sampling. In order to avoid any misunderstanding let us describe all three in detail.

The method of double sampling consists of the following steps:

(i) Out of the population π we select at random N individuals and ascertain for them the values of the character Y. This sample will be denoted by S_1. The sample S_1 is meant to estimate the proportions p_i.

(ii) Now we proceed to sample the strata π_i and this is the second of the sampling processes mentioned. Out of each stratum π_i we select at random m_i individuals which form a sample to be denoted by $S_{2,i}$ and ascertain for each of these individuals, the value of the character X. The samples $S_{2,i}$ serve to estimate the mean value of X in each of the strata π_i. These estimates and the estimates of the proportions (3) obtained previously from the sample S_1, permits us to estimate the grand mean $\overline{X}$.

The combination of (i) and (ii) forms the method of double sampling. Denote by m_0 the sum of the sizes m_i of all the samples $S_{2,i}$, so that

$$m_0 = \sum_{i=1}^{s} m_i \tag{4}$$

and by A and B the costs of ascertaining for one individual the value of X and that of Y respectively. Finally, let C denote the total amount of money available for the collection of data. Then the numbers m_0 and N must be subject to the restriction

$$Am_0 + BN = C\ . \tag{5}$$

We shall consider what values of m_i, m_0 and N, satisfy the conditions (4) and (5), yield the greatest accuracy in estimating the mean value of X by the method of double sampling. This accuracy will then be compared with that attainable in the ordinary way, that is without the application of the method of double sampling. For this purpose we shall consider a third sampling process by which all the funds C available are spent on selecting at random a number, say M, of the elements of π and in ascertaining for each of them the value of X. Denote this third sample by S_0. Its size will have to be $M = C/A$. In order to get an idea of the utility of the method of double sampling we shall compare its accuracy with that of the ordinary mean value of X calculated from the sample S_0.

3. FIRST METHOD OF APPROACH

In the present paper[1] we shall make no assumption as to the character of the regression of X on Y in the population π. Denote by X_1, X_2, $\cdots$, X_s, the mean values of X in each of the strata. It follows that the grand mean of X which is to be estimated is

$$\overline{X} = \sum_{i=1}^{s} p_i X_i\ . \tag{6}$$

[1] The same problem, under the assumption that the regression of X on Y has a certain known form, forming the second method of approach, will be considered in a later paper.

Further denote by σ_i the standard deviation of X within the ith stratum.

Denote by n_i the number of individuals drawn in the first sample S_1 which fall within the ith stratum and introduce

$$r_i = n_i/N \ . \tag{7}$$

Let x_{ij} denote the value of X of the jth individual drawn from the ith stratum to form the sample $S_{2,i}$. Put

$$x_i = \frac{1}{m_i} \sum_{j=1}^{m_i} x_{ij} \ . \tag{8}$$

We shall start by considering what function F_1 of the observations, namely of the numbers (7) and of

$$x_{i1}, x_{i2}, \cdots, x_{im_i} \qquad \text{for} \qquad i = 1, 2, \cdots, s \tag{9}$$

would be suitable as an estimate of (6). We shall limit our considerations to homogeneous functions of second order, of the form

$$F_1 = \sum_{i=1}^{s} \sum_{j=1}^{s} \sum_{k=1}^{m_j} \lambda_{ijk} r_i x_{jk} \tag{10}$$

where λ_{ijk} is a constant coefficient. Out of all such functions we shall select and term the best unbiased estimate of $\overline{X}$, the one which has the following properties:

(i) The mathematical expectation of F_1 is identically equal to $\overline{X}$.

(ii) The variance of F_1 is smaller than that of any other function of the form (10) having the property (i).

Denoting by $\mathcal{E}(u)$ the mathematical expectation of any variable u, we may rewrite (i) in the following form.

$$\mathcal{E}(F_1) \equiv \sum_{i=1}^{s} \sum_{j=1}^{s} \sum_{k=1}^{m_j} \lambda_{ijk} \mathcal{E}(r_i x_{jk}) \equiv \sum_{i=1}^{s} p_i X_i \ . \tag{11}$$

When calculating expectations, we shall use the assumption that the population π and all of its strata are so large compared to the sample drawn that the particular drawings can be considered as mutually independent. We shall notice further that, in spite of the fact that the samples $S_{2,i}$ probably will be drawn out of the sample S_1 and not directly from the strata π_i, the variable x_{jk} is independent of r_i. This follows from the circumstance that when we draw the first

sample S_1, we do so without any consideration of the values of X. It follows that

$$\mathcal{E}(r_i x_{jk}) = \mathcal{E}(r_i)\mathcal{E}(x_{jk}) = p_i X_j \,. \tag{12}$$

Substituting (12) in (11) and rearranging, we have

$$\sum_{i=1}^{s} p_i \Big(\sum_{j=1}^{s} X_j \sum_{k=1}^{m_j} \lambda_{ijk} - X_i \Big) \equiv 0 \,. \tag{13}$$

The necessary and sufficient condition for this equality to hold good identically, that is to say, whatever the unknown proportions p_1, p_2, $\cdots$, p_s may be, is that the coefficients of the p_i vanish, i.e.

$$\sum_{j=1}^{s} X_j \sum_{k=1}^{m_j} \lambda_{ijk} - X_i \equiv 0 \qquad \text{for} \qquad i = 1, 2, \cdots, s \,. \tag{14}$$

As we do not know the values of the X_j, these equalities should again hold good identically, that is to say, whatever the values of the X_j. The equation (14) can be rewritten in the form

$$\sum_{j=1}^{i-1} X_j \sum_{k=1}^{m_j} \lambda_{ijk} + X_i \Big(\sum_{k=1}^{m_i} \lambda_{iik} - 1 \Big) + \sum_{j=i+1}^{s} X_j \sum_{k=1}^{m_j} \lambda_{ijk} \equiv 0 \tag{15}$$

and its identical fulfilment is easily seen to require that

$$\begin{aligned} &\sum_{k=1}^{m_j} \lambda_{ijk} = 0 \qquad \text{for any} \qquad j \neq i;\ i, j = 1, 2, \cdots, s \qquad \text{and} \\ &\sum_{k=1}^{m_i} \lambda_{iik} = 1 \qquad \text{for} \qquad i = 1, 2, \cdots, s \,. \end{aligned} \tag{16}$$

Equations (16) express the necessary and sufficient conditions for the function F_1 to be unbiased, considered as an estimate of $\overline{X}$. Obviously, there is an infinite number of systems of coefficients λ_{ijk} satisfying (16) and therefore an infinity of unbiased estimates of $\overline{X}$ of the form (10). We shall now determine the one that we agreed to call the "best," i.e., that which has the smallest possible variance. Let us assume that the values of the λ_{ijk} are fixed somehow satisfying the conditions (16) and calculate the variance of F_1. Denoting it by V_1 we shall have, owing to (6)

$$\begin{aligned} V_1 &= \mathcal{E}(F_1 - \overline{X})^2 \\ &= \mathcal{E}\Big(\sum_{i=1}^{s} (r_i \xi_i - p_i X_i) \Big)^2 \end{aligned} \tag{17}$$

where

$$\xi_i = \sum_{j=1}^{s} \sum_{k=1}^{m_j} \lambda_{ijk} x_{jk} \tag{18}$$

is again independent of r_i. We have further

$$\begin{aligned} V_1 = &\sum_{i=1}^{s} \mathcal{E}((r_i\xi_i - p_iX_i)^2) \\ &+ 2\sum_{i=1}^{s-1} \sum_{h=i+1}^{s} \mathcal{E}\{(r_i\xi_i - p_iX_i)(r_h\xi_h - p_hX_h)\}. \end{aligned} \tag{19}$$

But

$$\begin{aligned} \mathcal{E}(r_i\xi_i - p_iX_i)^2 &= \mathcal{E}(\{(r_i - p_i)\xi_i + p_i(\xi_i - X_i)\}^2) \\ &= \mathcal{E}((r_i - p_i)^2\xi_i^2) + 2p_i\mathcal{E}\{(r_i - p_i)(\xi_i^2 - X_i\xi_i)\} \\ &\quad + p_i^2\mathcal{E}\{(\xi_i - X_i)^2\} \\ &= \mathcal{E}\{(r_i - p_i)^2\}\mathcal{E}(\xi_i^2) + p_i^2\mathcal{E}\{(\xi_i - X_i)^2\} \end{aligned} \tag{20}$$

owing to the independence of ξ_i and r_i and to the fact that $\mathcal{E}(r_i) = p_i$. Now it is known that

$$\mathcal{E}\{(r_i - p_i)^2\} = \mathcal{E}(r_i^2) - p_i^2 = p_iq_i/N \tag{21}$$

with $q_i = 1 - p_i$. Since[2]

$$\mathcal{E}\{(\xi_i - X_i)^2\} = \mathcal{E}(\xi_i^2) - X_i^2\,, \tag{22}$$

to calculate (20) it will be sufficient to calculate $\mathcal{E}\{(\xi_i - X_i)^2\}$ or the variance of ξ_i. Applying the usual formula for the variance of a linear function of independent variables and remembering that the variance of x_{jk} is denoted by σ_j^2, we have

$$\mathcal{E}\{(\xi_i - X_i)^2\} = \sum_{j=1}^{s} \sigma_j^2 \sum_{k=1}^{m_j} \lambda^2_{ijk}\,. \tag{23}$$

It follows that

$$\begin{aligned} \mathcal{E}\{(r_i\xi_i - p_iX_i)^2\} = &\frac{p_iq_i}{N}\left(\sum_{j=1}^{s} \sigma_j^2 \sum_{k=1}^{m_j} \lambda^2_{ijk} + X_i^2\right) \\ &+ p_i^2 \sum_{j=1}^{s} \sigma_j^2 \sum_{k=1}^{m_j} \lambda^2_{ijk}\,. \end{aligned} \tag{24}$$

[2] Owing to (16) the expectation of ξ_i is obviously equal to X_i.

We may now go on and calculate the expectation of the other type of term in (19). We have

$$\begin{aligned}\mathcal{E}\{(r_i\xi_i - p_iX_i)(r_h\xi_h - p_hX_h)\} &= \mathcal{E}(r_ir_h\xi_i\xi_h) - p_ip_hX_iX_h \\ &= \mathcal{E}(r_ir_h)\mathcal{E}(\xi_i\xi_h) - p_ip_hX_iX_h\end{aligned} \tag{25}$$

again owing to the independence of ξ_i and r_i. It is known that

$$\mathcal{E}(r_ir_h) = p_ip_h\left(1 - \frac{1}{N}\right). \tag{26}$$

Further

$$\mathcal{E}(\xi_i\xi_h) = \mathcal{E}\left\{\sum_{j=1}^{s}\sum_{k=1}^{m_j}\lambda_{ijk}x_{jk}\sum_{g=1}^{s}\sum_{u=1}^{m_g}\lambda_{hgu}x_{gu}\right\}. \tag{27}$$

Remembering that

$$\mathcal{E}(x_{jk}) = X_j \qquad \text{and} \qquad \mathcal{E}(x^2_{jk}) = \sigma_j^2 + X_j^2 \tag{28}$$

and that the x_i are assumed to be mutually independent, we have

$$\mathcal{E}(\xi_i\xi_h) = \sum_{j=1}^{s}\sigma_j^2\sum_{k=1}^{m_j}\lambda_{ijk}\lambda_{hjk} + \left(\sum_{j=1}^{s}X_j\sum_{k=1}^{m_j}\lambda_{ijk}\right)\left(\sum_{g=1}^{s}X_g\sum_{u=1}^{m_g}\lambda_{hgu}\right). \tag{29}$$

Until the present moment we have not used the conditions (16) for the unbiased character of the estimate F_1. Therefore the formula for the variance V_1 which we could obtain by substituting (24), (25), (26) and (29) into (19) would be perfectly general. We shall use it in our second method of approach. Now however we shall simplify (29) by substituting (16). We have

$$\mathcal{E}(\xi_i\xi_h) = \sum_{j=1}^{s}\sigma_j^2\sum_{k=1}^{m_j}\lambda_{ijk}\lambda_{hjk} + X_iX_h\,. \tag{30}$$

Now

$$\begin{aligned}V_1 = &\sum_{i=1}^{s}\left(p_i^2 + \frac{p_iq_i}{N}\right)\sum_{j=1}^{s}\sigma_j^2\sum_{k=1}^{m_j}\lambda^2{}_{ijk} + \sum_{i=1}^{s}\frac{p_iq_i}{N}X_i^2 \\ &+ \frac{2}{N}\sum_{i=1}^{s-1}\sum_{h=i+1}^{s}p_ip_h\left\{(N-1)\sum_{j=1}^{s}\sigma_j^2\sum_{k=1}^{m_j}\lambda_{ijk}\lambda_{hjk} - X_iX_h\right\}.\end{aligned} \tag{31}$$

Without attempting to simplify this expression at the present stage, let us select the λ_{ijk} so as to minimize (31) while keeping the relations

(16) satisfied. For this purpose we will differentiate with respect to λ_{ijk} the expression

$$f = V_1 - 2\sum_{i=1}^{s}\sum_{j=1}^{s}\alpha_{ij}\sum_{k=1}^{m_j}\lambda_{ijk} \tag{32}$$

where the α_{ij} are Lagrange arbitrary multipliers, and equate the derivatives to zero. After some rearrangement, we get the following equation:

$$\frac{1}{N}p_i\sigma_j^2\left(\lambda_{ijk} + (N-1)\sum_{h=1}^{s}p_h\lambda_{hjk}\right) = \alpha_{ij}\ . \tag{33}$$

Summing both sides with respect to k from zero to m_j and taking into account (16), we get

$$\begin{aligned}\frac{N-1}{N}p_ip_i\sigma_j^2 &= m_j\alpha_{ij} \qquad \text{for} \qquad i \neq j\\ \frac{1}{N}p_i\sigma_j(1 + (N-1)p_j) &= m_j\alpha_{jj}\ .\end{aligned} \tag{34}$$

Substituting these results in (33), we obtain

$$\lambda_{ijk} = \frac{N-1}{m_j}p_j - (N-1)\sum_{h=1}^{s}p_h\lambda_{hjk} = \lambda_{.jk} \quad \text{(say)} \tag{35}$$

$$\lambda_{jjk} = \lambda_{.jk} + 1/m_j\ . \tag{36}$$

Substituting in (35) the values of λ_{hjk} thus obtained, we easily get

$$\begin{aligned}\lambda_{ijk} &= \lambda_{.jk} = 0 \qquad \text{for} \qquad i \neq j\\ \lambda_{jjk} &= 1/m_j\ .\end{aligned} \tag{37}$$

Substituting these values into (10) we obtain the following expression for the best unbiased estimate of $\overline{X}$:

$$F_1 = \sum_{i=1}^{s}r_ix_i\ . \tag{38}$$

The formula for the variance, V_1, of F_1 is obtained by substituting (37) in (31)

$$V_1 = \sum_{i=1}^{s}\left\{\left(p_i^2 + \frac{p_iq_i}{N}\right)\frac{\sigma_i^2}{m_i} + \frac{p_iq_i}{N}X_i^2\right\} - \frac{2}{N}\sum_{i=1}^{s-1}\sum_{j=i+1}^{s}p_ip_jX_iX_j \tag{39}$$

which immediately reduces to the following form most convenient for

finding the system of values of N and the m_i that assure the greatest accuracy is estimating $\overline{X}$:

$$V_1 = \frac{1}{m_0}\left(\sum_{i=1}^{s} \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}}\right)^2$$

$$(40) \qquad + \sum_{i=1}^{s} m_i\left(\frac{\sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}}}{m_i} - \frac{\sum_{i=1}^{s} \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}}}{m_0}\right)^2$$

$$+ \frac{1}{N}\sum_{i=1}^{s} p_i(X_i - \overline{X})^2 .$$

It is seen that none of the three terms in the right hand side can be negative. There is only one term which depends directly on $m_1, m_2, \cdots, m_s$, namely the second, the others being dependent on $m_0 = \sum_{i=1}^{s} m_i$ and on N. It follows that once N and m_0 are fixed in one way or another the value of V_1 depends on the m_i and the value they ascribe to the second term. It is easily seen that its minimum value is zero and that this is attained, whenever for each value of $i = 1, 2, \cdots, s$

$$(41) \qquad m_i = m_0\sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}} / \sum \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}} .$$

Owing to the fact that the m_i are integers, this ideal seldom can be attained exactly, but it may be approached as far as possible. We shall further assume that the m_i are selected in closest agreement with (41) and that the second term in (40) is negligible compared with the remaining two.

We must now consider what values of m_0 and N satisfying (5) are likely to give the smallest value to the sum of only two terms in (40), say

$$(42) \qquad V'_1 = \frac{1}{m_0}\left(\sum_{i=1}^{s} \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}}\right)^2 + \frac{1}{N}\sum_{i=1}^{s} p_i(X_i - \overline{X})^2 .$$

Owing to the complex structure of the first of these terms, an accurate solution of the problem is difficult to attain. However, it is easy to get an approximate solution which will probably in most cases be sufficient.

In most cases, whenever we do not make any special assumption concerning the character of the regression of X on Y, we shall probably classify the population π into only a few strata whence it may be assumed that the proportions p_i will not be very small and consequently

$p_iq_iN^{-1}$ will be considerably smaller than any of the p_i^2. If so, then the value of the square root

$$\sqrt{p_i^2 + p_iq_iN^{-1}} \tag{43}$$

will be very much the same as that of p_i. For example, if $p_i=.1$, $q_i=.9$ and $N=100$, it is .1044 and if the value of Np_i were somewhat larger, the agreement would be still better. Therefore, instead of trying to minimize (42) we may usefully start by trying to minimize, say

$$\begin{aligned} V_1'' &= \frac{1}{m_0}\left(\sum_{i=1}^{s} p_i\sigma_i\right)^2 + \frac{1}{N}\sum_{i=1}^{s} p_i(X_i - \overline{X})^2 , \qquad \text{or} \\ V_1'' &= \frac{a^2}{m_0} + \frac{b^2}{N} \end{aligned} \tag{44}$$

for short. Denote by v_1 and v_2 the smallest numbers of selections into the first and the second sample respectively, the total cost of which is the same, so that

$$v_1B = v_2A \ . \tag{45}$$

If m'_0 and N' are the integer numbers minimizing (44) and satisfying (5), then any change of these values by taking instead of them either

$$\begin{aligned} &m_0' - v_2 \quad \text{and} \quad N' + v_1 \quad \text{or} \\ &m_0' + v_2 \quad \text{and} \quad N' - v_1 \end{aligned} \tag{46}$$

will increase the value of (44). This means that m_0' and N' satisfy the inequalities

$$\frac{a^2}{m'_0 + v_2} + \frac{b^2}{N' - v_1} > \frac{a^2}{m'_0} + \frac{b^2}{N'} < \frac{a^2}{m'_0 - v_2} + \frac{b^2}{N' + v_1} \cdot \tag{47}$$

These inequalities reduce easily to the following ones

$$\frac{1 - \frac{v_2}{m'_0}}{1 + \frac{v_1}{N'}} < \frac{a^2v_2}{m_0'^2}\frac{N'^2}{b^2v_1} < \frac{1 + \frac{v_2}{m'_0}}{1 - \frac{v_1}{N'}} \tag{48}$$

showing that in order to minimize (44) while keeping (5) fixed, we have to select m_0 and N as nearly as possible proportionately to $a\sqrt{v_2}$ and $b\sqrt{v_1}$ respectively. Putting for a moment

$$m_0 = N(a/b)\sqrt{v_2/v_1} \tag{49}$$

and substituting it in (5), we get

$$N = Cb\sqrt{v_1}/(Aa\sqrt{v_2} + Bb\sqrt{v_1}) \tag{50}$$

which gives

$$m_0 = Ca\sqrt{v_2}/(Aa\sqrt{v_2} + Bb\sqrt{v_1}) \; . \tag{51}$$

Using (45) and eliminating v_1 and v_2 we may rewrite (50) and (51) in the final form

$$N = Cb/(a\sqrt{AB} + bB) \tag{52}$$

$$m_0 = Ca/(aA + b\sqrt{AB}) \tag{53}$$

where

$$a = \sum_{i=1}^{s} p_i\sigma_i \tag{54}$$

and

$$b^2 = \sum_{i=1}^{s} p_i(X_i - \overline{X})^2 \; . \tag{55}$$

Here we must remember the following circumstances:

(1) that both m_0 and N are integers and therefore formulae (52) and (53) should be calculated to the nearest integer;

(2) that a change in m_0 by one unit must be compensated by a change in N by several units;

(3) that the solutions which would be obtained by taking exact values of (52) and (53) would minimize the value of (44) with a as given in (54), whereas the value of the variance in (42) depends on

$$a_1 = \sum_{i=1}^{s} \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}} \tag{56}$$

instead of a.

It follows that the integers nearest to (52) and (53) may not necessarily minimize (42), but since the difference between a and a_1 is slight, they may be considered as the first approximations. Frequently these first approximations will also be the accurate values.

In order to find the second approximation, we may calculate a_1 as in (56) substituting N as calculated from (52) and then substitute the value obtained into (53) to get a new value of m_0. This sometimes will indicate the necessity of increasing the original m_0 by unity. How-

ever, owing to the fact that both m_0 and N must be integers, the real check of what values do give the minimum is obtained simply by substituting into (42) both the first approximations to m_0 and N and a few neighboring systems of values, e.g., m_0-1 and m_0+1 and the corresponding values of N.

4. EXAMPLE I

It may be useful to illustrate the above theory by some simple examples. Assume that there are only three strata, so that $s=3$. Assume further the following values of the constants involved:

$$\begin{aligned} &p_1 = \tfrac{1}{4}\,, \quad && p_2 = \tfrac{2}{4}\,, && p_3 = \tfrac{1}{4}\,, \\ &X_1 = 1\,, && X_2 = 3\,, && X_3 = 6\,, \\ &\sigma_1 = 1\,, && \sigma_2 = 2\,, && \sigma_3 = 4\,, \\ &A = 4\,, && B = 1\,, && C = 500\,. \end{aligned} \tag{57}$$

In order to calculate the values of m_0 and N, we calculate

$$a = 2.25, \tag{58}$$

$$\overline{X} = 3.25, \tag{59}$$

$$b^2 = 3.1875 = (1.7854)^2\,. \tag{60}$$

It follows that

$$N = 142 \qquad \text{(to the nearest integer)} \tag{61}$$

and accordingly

$$m_0 = 89\,. \tag{62}$$

It will be seen that the necessity of taking m_0 to the nearest integer permits an increase in the value of N to 144, without exceeding the limit of expense, 500 units. Let us now see how $m_0=89$ should be distributed between the three strata. Easy calculations give

$$\begin{aligned} \sigma_1\sqrt{p_1^2 + p_1q_1N^{-1}} &= .2526 \\ \sigma_2\sqrt{p_2^2 + p_2q_2N^{-1}} &= 1.0035 \\ \sigma_3\sqrt{p_3^2 + p_3q_3N^{-1}} &= 1.0104 \\ \sum_{i=1}^{3} \sigma_i\sqrt{p_i^2 + p_iq_iN^{-1}} &= 2.2664\,. \end{aligned} \tag{63}$$

Hence, using (41) and taking the nearest integers, we get

$$m_1 = 10\,, \quad m_2 = 39\,, \quad m_3 = 40\,. \tag{64}$$

With this system of the m_i the middle term of formula (40) would have the value

$$(65)\qquad \sum_{i=1}^{s} m_i \left(\frac{\sigma_i \sqrt{p_i^2 + p_i q_i N^{-1}}}{m_i} - \frac{\sum \sigma_i \sqrt{p_i^2 + p_i q_i N^{-1}}}{m_0} \right)^2 = .0000048564 .$$

The total value of V_1 in (40) is found to be

$$(66)\qquad V_1 = .079855$$

and it follows that by using (64) the value of the middle term is for all practical purposes negligible. It is interesting to compare this value with the one which could be obtained without adjusting the numbers m_i to the variability and the size of the strata, i.e., without using (41). Putting arbitrarily $m_1 = 29$, $m_2 = m_3 = 30$, we get

$$(67)\qquad V_1 = .091927 .$$

Comparing this with (66) we see that neglecting to adjust the m_i according to formula (40) results, in this particular example, in an increase of the variance by over 15 per cent, which is a considerable and unnecessary loss in accuracy.

This is the situation if we use for m_0 and N the values found as first approximations. Substituting 144 for N in (56) and calculating a_1 and then using this value instead of a to calculate the second approximation of m_0, we get

$$(68)\qquad m_0 = 89.6783$$

which suggests that the best integer values of m_0 and N are $m_0 = 90$ and $N = 140$. However using them we obtain

$$(69)\qquad V_1 = .079866.$$

Again using $m_0 = 88$ and $N = 148$ we get

$$(70)\qquad V_1 = .079888$$

and it appears that the first approximation gives in fact the best possible result, but the actual difference is negligible.

We must now see whether this result, the best that could be obtained by the method of double sampling is actually better than what could be obtained by spending all the money available to collect as much data on X as possible, i.e. by drawing the unrestricted random sample S_0 (see p. 103).

The best linear estimate of $\overline{X}$ calculated from the sample S_0 would be the sample mean $\bar{x}$. Its variance, V_0, is known to be connected with the symbols of this paper by means of the formula

$$V_0 = \frac{1}{M}\left(\sum_{i=1}^{s} p_i\sigma_i^2 + \sum_{i=1}^{s} p_i(X_i - \overline{X})^2 \right). \tag{71}$$

It is easy to find that in our example

$$M = C/A = 125 \tag{72}$$

and

$$V_0 = .0755\ . \tag{73}$$

It follows that in this particular case the method of double sampling even supplemented by the optimum adjustment of the numbers of sampling, is equivalent to a certain loss of accuracy of the final result. Taking the ratio of the variances (73) and (66)

$$V_1/V_0 = 1.058 \tag{74}$$

we see that this loss of accuracy amounts to nearly 6 per cent. This unfavourable result is, of course, due to the fact that the differentiation between the strata with respect to the values of X is small compared with the variability of the strata themselves and to the fact that the difference in the cost of obtaining data on X and Y is comparatively small. To illustrate this point let us consider the following examples.

5. EXAMPLE II

Assume that the values of the p_i, X_i and σ_i are exactly as in Example I and put

$$A = 40\ , \qquad B = 1\ , \qquad C = 5000 \tag{75}$$

so that the process of obtaining data on Y is now 40 times cheaper than that on X, while the ratio of C/A is the same as formerly. It follows that V_0 in this case will be exactly the same as formerly (73), but the minimum value of V_1 will change. We shall have

$$m_0 = 111\ , \qquad N = 560 \tag{76}$$

and, assuming that the m_i are fixed according to (41), we get finally

$$V_1 = .05147 \tag{77}$$

and it is seen that this value is exceeded by V_0 by more than 46 per cent!

6. EXAMPLE III

Here we shall keep the values of the p_i, the σ_i, and those of A, B and C as in Example I but change the values of the X_i so as to increase the value of b, namely put

$$X_1 = 1 , \quad X_2 = 6 , \quad X_3 = 11 . \tag{78}$$

Then

$$b^2 = 12.5 = (3.53553)^2 \tag{79}$$

and

$$V_0 = .1500 . \tag{80}$$

On the other hand, applying the method of double sampling and taking the optimum system of numbers of samplings, viz.,

$$m_1 = 8 , \quad m_1 = 31 , \quad m_3 = 31 , \quad m_0 = 70 , \quad N = 220 \tag{81}$$

we get

$$V_1 = .1298, \tag{82}$$

a gain in accuracy in comparison with (80) of about 15 per cent

7. CONCLUSIONS

(i) The examples II and III show that under favorable conditions the method of double sampling is a very powerful tool of statistical research.

(ii) However, the advantages of methods are but rarely universal and in certain cases, as for instance in the above example I, the direct unrestricted sampling may be more efficient than the method of double sampling.

(iii) Without a certain previous knowledge of the properties of the population sampled it is impossible to say which of the two methods will be more efficient.

(iv) It is also impossible to tell in advance what the values of N, m_0, and of the m_i should be to assure the greatest accuracy of the double sampling method.

(v) On the other hand, if certain properties of the sampled population π are known, or can be estimated, then it is possible to estimate the values of m_0 and N and also those of the m_i by which the method of double sampling gives the greatest possible accuracy. The properties of population π needed for this purpose are the values of the p_i, σ_i and X_i. They could be estimated by means of a preliminary inquiry on the lines suggested by me during the conference at the U. S. Department

of Agriculture Graduate School and also in my previous publications on sampling human populations.[3] Once approximate values of the p_i, σ_i and X_i are obtained, they should be substituted into formulae (52), (53) and (41) to obtain the approximations of the optimum values of m_0, N and the m_i.

(vi) Before deciding whether to apply the method of double sampling, we should see that the prospects are that it will give better results than the direct unrestricted sampling of values of X.

For this purpose the approximate values of the p_i, σ_i and X_i should be substituted into (40) and (71) to obtain the approximate values of variance V_1 and V_0. The decision to apply the method of double sampling should be taken only if the approximate value of V_1 proves to be considerably smaller than that of V_0.

(vii) The steps described in (iii) and (iv) are possible only if some previous knowledge of the population π is available. This may be obtained from various sources: from some previous experience concerning the population π, or from a specially arranged preliminary inquiry. Such a preliminary inquiry consists of drawing from π a relatively small unrestricted random sample of individuals and in ascertaining for all of them the values of both characters under consideration X and Y. The data thus obtained should be used to estimate the p_i, the σ_i and the X_i.

In order to exemplify the kind of previous experience which may be used to plan future inquiries on the lines as indicated in (v) and (vi), I may mention a recent extensive Study of Consumer Purchases, a Federal Works Project administered by the Bureau of Labor Statistics, U. S. Department of Labor and the Bureau of Home Economics, U. S. Department of Agriculture, in cooperation with the National Resources Committee and the Central Statistical Board.[4] This inquiry was carried out by method of double sampling and therefore, in the process of working out the data, both the proportions p_i and the means X_i corresponding to particular strata and to many a character X must have been estimated. Probably the values of σ_i are also available. These figures could be used as pointed out in (v) and (vi) when planning any new inquiry concerning the same characters and the same or some similar population.

[3] J. Neyman: "An Outline of the Theory and Practice of Representative Method Applied in Social Research." Institute for Social Problems, Warsaw 1933. Polish with an English Summary.

J. Neyman: "On the Two Different Aspects of the Representative Method." J.R.S.S. 1934, pp. 558–625.

See also P. V. Sukhatme: "Contribution to the Theory of the Representative Method." Supplement to the J.R.S.S., Vol. II, 1935, pp. 253–268.

[4] This JOURNAL, Vol. XXXI, 1936, p. 135 and Vol. XXXII, 1937, p. 311.

THE PROBLEM OF MEASURING RADIO COVERAGE*

By L. D. H. Weld
Director of Research, McCann-Erickson, Inc.

Of the many unsolved problems connected with radio research, one of the most important is that of determining by uniform standards the area over which a broadcasting station may claim coverage. It is to this problem that the Joint Committee on Radio Research has been devoting the major part of its energies for several months.

This committee consists of five representatives of the broadcasting industry, five of the Association of National Advertisers, and five of the American Association of Advertising Agencies. It was organized in the fall of 1935, to study problems of radio research. Although the author of this paper is a member of the committee, he is expressing his personal views on the subject under discussion, rather than official findings of the Committee.

The reasons for the need of an early solution of this problem are obvious. Those who have studied the claims of broadcasting stations realize that their coverage maps have been determined by a variety of methods, and that the advertiser is at a loss to know over what territory he can really reach a sizeable audience with any single station or groups of stations. The situation is especially confusing in trying to compare the coverage of competing stations that serve the same areas.

There can never be a real meeting of minds on this subject until questions of definition have been settled. Just what do we mean by station coverage? To begin with, there are two approaches to this problem. The first is from the standpoint of the broadcaster. He necessarily wants to know over what area his station delivers a reasonably audible signal. Such information is fundamental, not only to the individual station, but also to the Federal Communications Commission, whose duty it is to decide on the number of stations, their locations, their power, and their frequencies.

The other approach is from the standpoint of the advertiser, who is interested primarily in knowing over what area a station reaches a substantial audience. He isn't so much concerned with the strength of the signal, as he is with the location of actual listeners.

The first approach naturally leads to a study of the area over which a signal of certain strength is delivered. We might call this the "signal

* A paper presented at a Joint Session of the American Statistical Association and the American Marketing Association, Atlantic City, New Jersey, December 29, 1937.

strength area." It represents the *potential* coverage of a station,—or the area in which people *can* hear the station if they want to.

The second approach naturally leads to a study of the area in which people actually tune in regularly to the station in question. This has been defined by the Joint Committee as the "listening area."

If signal strength areas and listening areas coincided, the problem would be greatly simplified. But studies made by the Joint Committee and by other organizations clearly prove that signal strength areas and listening areas do not necessarily coincide. In some cases they do (for all practical purposes); but in a large number of important instances they are substantially different. Sometimes the signal strength area is the larger, and sometimes the opposite is true.

This means that signal strength areas and listening areas are two different things. It is the object of this paper to prove this point. Not until we realize that there are two different problems will broadcasters and advertisers understand each other's points of view. Of course, many broadcasters do realize that listening areas are different from signal strength areas. The very fact that the two leading broadcasting companies have made elaborate studies to determine listening areas is proof of this point. It is to the interest of broadcasters to give to advertisers accurate information as to where their listeners are located, as well as to let them know where they can effectively deliver a program. Possibly the Federal Communications Commission may also want to take listening areas into consideration in the performance of its functions.

Before showing that signal strength areas and listening areas are two different things and do not coincide in many important instances, it is necessary to describe briefly the methods that have been used in determining these two types of areas.

With regard to signal strength measurements, there are two general types of surveys that have been made. One has been to delineate the area covered by a single station, by sending out a motor car equipped with the necessary apparatus in various directions from the city where the station is located, so as to determine the points where the signal falls below one-half millivolt. A contour map is then drawn, showing the area wherein the signal of over one-half millivolt is delivered. Such measurements have been of ground wave only. Little attention has been paid to noise level or interference. The one-half millivolt limit was arbitrarily set by the Federal Communications Commission, but has recently been discarded by them. Methods of measuring signal strength have not been standardized. This is a problem which the Joint Committee expects to tackle as soon as possible.

The other type of field strength measurements may be called area or locality surveys. The object is to go into one locality or district and measure the signal strength of all stations reaching that locality. One well-known service is based on this type of signal strength measurement, and in this instance account is taken of sky wave, noise level, and interference.

The commonest method of determining listening areas has been through an analysis of audience mail. The Joint Committee has studied the audience-mail method, but has come to the conclusion that the only practical method of determining listenership for all competing stations at the same time is through personal interviews.

In the examples given below showing the differences between signal strength areas and listening areas, the signal strength measurements have been obtained in different ways and have been furnished to the Joint Committee by broadcasting companies. The listening area data are those obtained through personal interviews by the Joint Committee in its experimental work in New England. The final technique for delineating listening areas by personal interviews has not yet been determined, but the maps and data below furnish sufficient proof that whatever refinements in technique are developed there are substantial differences between signal strength areas and listening areas in many cases.

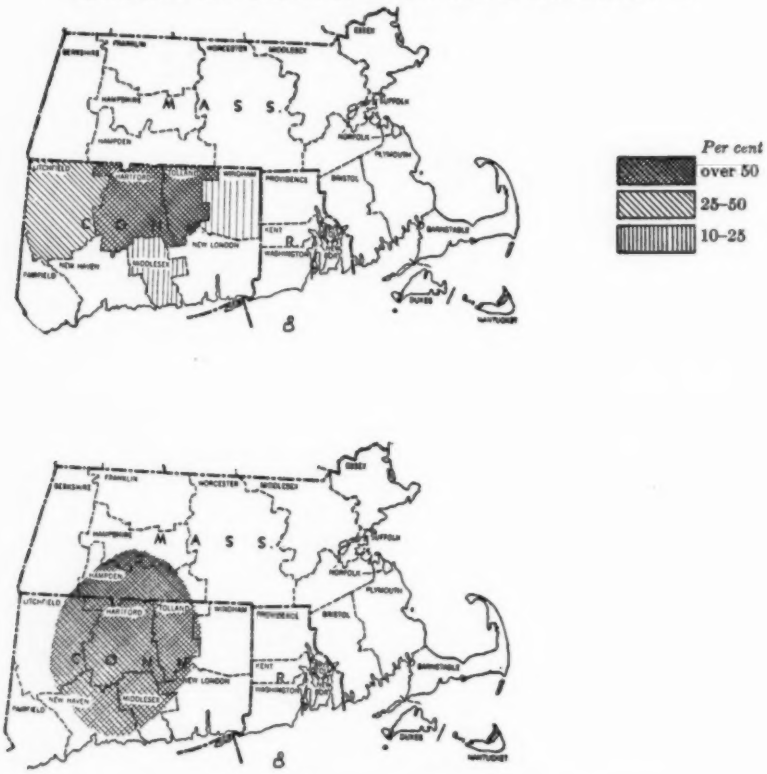
The maps show signal strength areas and listening areas determined by personal interviews,—all for daytime. Refinements in determining signal strength areas in the future may result in more accurate results. The same is true of listening areas. But it is inconceivable that such changes will alter the conclusions reached in this paper.

In the examples given herein there is one case (Station A) where the listening area is more restricted than the signal strength area. There is another case (Station B) where the two areas are practically the same. There are two other cases (Stations C and D) where the listening areas determined by personal interview are quite different and much more extensive than the signal strength areas. (Because of difficulties of reproduction in the JOURNAL, only the maps for Stations A and C are reproduced herein.)

The first two maps show the data for Station A. The map of the one-half millivolt area as determined by field strength measurement appears below and the map of the listening area as determined by personal interviews appears above. In the listening area maps, the heavy cross-hatching represents counties where over 50 per cent of the families listen regularly to the station; the next zone is that in which from 25 to 50 per cent listen; and the light vertical lines show where 10 to 25 per cent use the station.

It will be seen that according to signal strength, there is excellent coverage in Hampden County, Massachusetts, and some coverage in Hampshire County. The personal interview method shows practically no listeners in these two counties. Only Hartford and Tolland Counties have over 50 per cent listenership. Litchfield County has between 25 and 50 per cent and the other two light-shaded counties in Connecticut have under 25 per cent. Note that according to signal strength this

LISTENING AND SIGNAL STRENGTH AREAS FOR STATION "A"

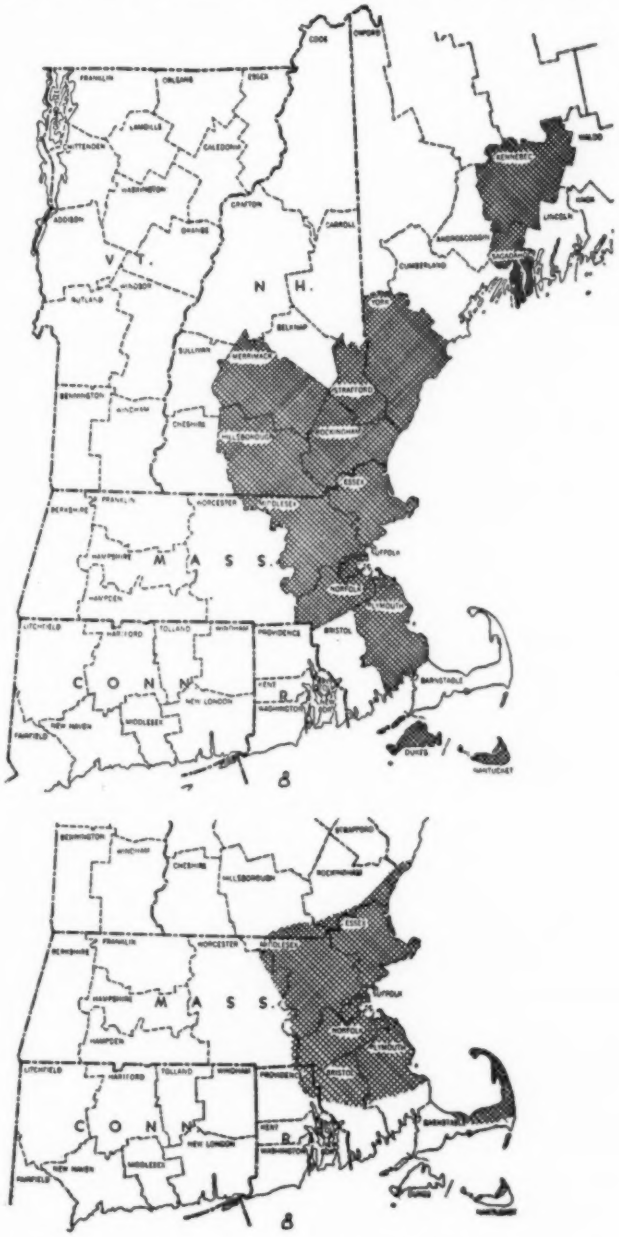


The upper map shows the listening area as determined from personal interviews. The lower map shows the signal strength area.

station reaches most of New Haven County where practically no listeners were found.

The next two maps (not shown here) compare the respective daytime areas for Station B. Suffice it to say that the two territories closely correspond, except that personal interviews found between 25 and 50 per cent of the families in Windham County, Connecticut, listening to this station, whereas the signal strength area does not include this county.

LISTENING AND SIGNAL STRENGTH AREAS FOR STATION "C"



The upper map shows the listening area as determined from personal interviews. The lower map shows the signal strength area.

The next two maps compare the signal strength area of Station C with the listening area determined by personal interviews. In the listening area map, we show only "primary" area,—that is where over 50 per cent of the families say they listen to this station. If we were to include secondary and tertiary counties, all of New Hampshire would be included, as well as many additional counties in Massachusetts and Maine.

It will be seen at a glance that the listening area as determined by personal interviews is much more extensive than the one-half millivolt area. The former includes several counties in Southern New Hampshire and in Maine. Note particularly how Kennebec and Sagadahoc Counties in Maine fall within the area of this station.

The maps for Station D (not reproduced here) show that the listening area extends much farther North and into New Hampshire than does the signal strength map.

We now come to some comparisons between field strength studies made by Edgar Felix of New Rochelle, who has developed an elaborate system of field strength measurement, and percentage of families listening as determined by personal interviews for various stations in New Haven, Connecticut, and Kent County, Rhode Island.

It should be explained that the use of the Felix figures involves no criticism at all of the Felix service. From what we know of this service, it is a very valuable one conducted thoroughly and with a high degree of intelligence. The comparison offered here is simply to strengthen our point that quality of reception of a station in a given area does not tell us the percentage of radio homes in that area which listens to the station.

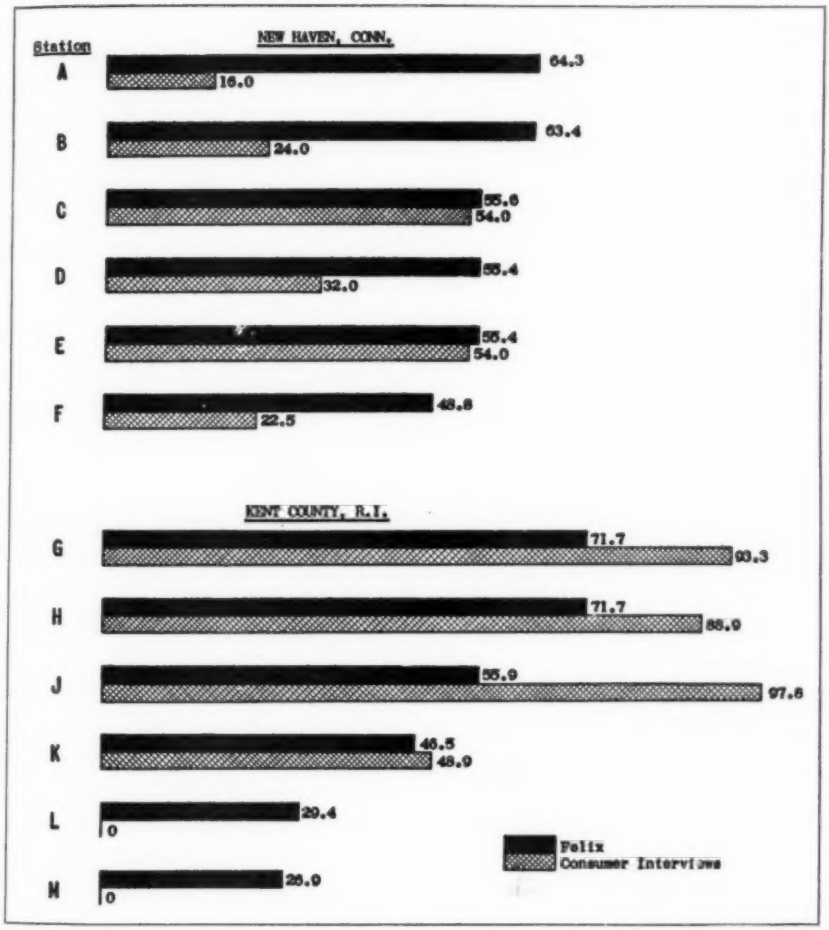
On the accompanying chart, it will be seen that the Felix rating for Station A is 64.3 per cent; personal interviews reveal only 16 per cent of the families listening regularly to this station. There is a similar difference in the case of Station B. It will be noted for Stations C and E that the results are practically the same by both methods. There are large discrepancies for Stations D and F.

In the case of Kent County, Rhode Island, it will be seen that actual listenership is much higher than the Felix rating would indicate for the first three stations. For Station K the results are practically the same. In the cases of Stations L and M, Felix finds a fairly good signal whereas personal interviews reveal nobody listening to these stations.

The cases cited on the foregoing pages are typical. Any number of additional instances could be used. The Technical Committee believes that these data clearly prove that areas determined by field strength surveys do not coincide with actual listening areas in many important

instances. In other words, there are other factors besides quality of signal that determine the areas in which people regularly listen to a broadcasting station.

FIELD STRENGTH RATINGS COMPARED WITH PERSONAL INTERVIEW RATINGS



Some of the reasons why signal strength areas and listening areas do not coincide are as follows: for a given station the signal may be clear, but the listener prefers to hear the same program on another station that delivers an even better signal; or, the signal may be poor, judged from engineering standards, and yet be the best that can be obtained; or, preference for a station in the listener's home state is sometimes a factor; there is also the matter of habit in listening to cer-

tain stations; and finally there is the all-important question of average quality of programs delivered by different stations,—a subject that will be referred to below.

The foregoing discussion explains why advertisers and advertising agencies are primarily interested in listening areas, and why the Joint Committee, through its Technical Committee, has been making intensive studies first in New England, and later in scattered counties throughout the country, in order to find the best technique for determining such areas.

This has been a long and complicated task. The principal problem has been to discover the best way of asking people what stations they generally or regularly use for the reception of programs. We made our first experiments in the Hartford territory, extending them to other sections of Southern New England, and then covered the whole of New England. Since then we have made additional tests in individual counties in New England and finally in five scattered counties, one in Pennsylvania, three in the Mid-West, and one in the South. In all, there have been about 10,000 personal interviews and fifteen different forms of questionnaire have been tried out. Station mail data for fifteen stations have been tabulated and analyzed. The construction of between 200 and 250 maps and charts has been necessary. The tabulation of the data and the preparation of material for the use of the Technical Committee have meant a tremendous amount of detail work.

Space forbids a detailed description of the difficulties encountered, or of the various techniques that have been tested out by the committee. It has already been mentioned that after consideration of various approaches, the Committee decided that the only safe and practical method is through personal interviews, and we have been trying out different wordings of our questionnaire. We have been working on the basis of an average of 100 calls per county, and various tests have indicated that a sample of this size yields reliable results. The county is used as the unit, because it is a small enough geographical district for the laying out of listening areas, and because various economic data, including estimates of number of radio homes (prepared and issued by the Joint Committee) are available on this basis.

The Technical Committee expects to make a few more tests in January or February, 1938, and then hopes to reach a final conclusion on the best technique for determining listening areas. Not that this will be a simple thing to do. In the first place, there will be the question of the degree of accuracy possible or necessary. It is obvious now that complete accuracy cannot be obtained. The extent to which a station is listened to in any one locality depends not only upon the clarity of

its signal, but on the average appeal of all of its programs. There are individual instances where an obscure station may have one outstanding program that is listened to by a substantial number of people. All we can hope to obtain is a general average of listening. Our experiments show that the average amount of listening to different stations in one locality varies substantially, and we believe that sufficiently accurate data can be obtained for all practical purposes.

There is then the problem of dividing the listening area into primary, secondary, and probably tertiary areas. So far we have been considering as the primary zone, the area in which 50 per cent or more of the radio homes regularly use the station. The secondary zone is from 25 to 50 per cent, and the tertiary zone, from 10 to 25 per cent. These limits have not been finally decided on, and the final decision will have to be a fairly arbitrary one. An unfortunate result of any such zoning system is that it may be slightly unfair to border-line stations. If a station is listened to by 49 per cent of the people in a certain county, that station will naturally be disappointed to find the county put into the secondary zone.

So far, the Joint Committee has been considering only the setting up of these zones by counties without showing the percentage of radio homes listening regularly to each station in each county. It would be unfair to give out these actual percentages. On the other hand, through the use of these county percentages, held under lock and key in a central bureau, it would be possible to figure the approximate normal or average circulation of a station in its listening area. This would mean that advertisers would have figures for radio analogous to the circulation figures they have for magazines and newspapers. It has not been decided whether such circulation figures should be compiled, but it is obvious that they would be of substantial value to advertisers.

When the Joint Committee has finally decided on the best technique for determining listening areas, there will still be the problem of putting this technique into effect throughout the country. It will be a big and expensive job. If the method determined is accepted as the "official" method of delineating listening areas, it seems as though ways and means ought to be found for financing this important project.

QUANTITATIVE METHODS IN POLITICS*

By Stuart A. Rice
Chairman, United States Central Statistical Board

The title of this paper was the title of a book published in 1928, and I am speaking as its author. In that book I sought to replace a number of general descriptive statements concerning American politics and political occurrences with precise numerical statements. Simple statistical methods were applied to the analysis of commonplace data, especially to data that related to political attitudes and public opinion.

The accurate measurement of public opinion is a central problem for a science of politics. In authoritarian states such measurement would be difficult, whether officially or unofficially sponsored. In democratic states, on the other hand, the idea and the habit of measuring opinion are firmly established. Representative government assumes that the will (or opinion) of the people should be ascertained and given effect through elections. General and primary elections, referenda and straw votes are a part of the same culture complex, and all are statistical measurings of public opinion. I believe that Mr. Gallup's important statistical data have interested newspaper readers because the American public is habituated to elections and polls.

The economic importance of opinions and attitudes is generally recognized. To illustrate, the National City Bank asserts in its December, 1937, review of economic conditions:

> The business of the country is an aggregate of the actions and policies of millions of individuals and corporations, all following the best judgments they can bring to bear on their own problems; and it might be supposed that their difference of opinion would cancel out. But that is not always the case. They are all subject to the same economic and psychological influences. By and large they tend to go forward together, planning and spending confidently; and conversely, they curtail and economize together. The changes from one policy to the other mean a vast difference in the volume of trade and the level of prices.

While such statements as this stress the importance of opinion as an economic factor, there has been comparatively little effort to evaluate this factor quantitatively, except, perhaps, in the case of market analyses. Yet I believe that many aspects of the opinion factor in business are measurable. In the citation from the National City Bank just quoted there is suggested a counterpart in business to what I have termed the "landslide tendency" in politics. Landslides of opinion, both as to politics and as to prudent economic behavior, probably

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

result from the rapid growth of mass communication through newspapers, motion pictures, and the radio. As agencies of mass communication extend their influence, the landslides become greater. Here is an hypothesis of seeming importance, susceptible, I think, of quantitative testing. Unfortunately for the purpose, the votes of stockholders at meetings of corporations are less adequate indexes of opinion than their analogues, the popular votes in political elections.

It need not be argued further that opinions and attitudes have important consequences, justifying attempts to express them in numerical terms. We turn then to methods of measurement. The traditional or rule-of-thumb method is an election.

Elections presuppose the complete summation of opinion upon current political issues within a universe (the electorate); just as straw votes assume representative sampling. Actually, in democratic countries, elections never obtain complete "coverage" of the electorate. The non-voter is a perennial problem of American politics. Nor do elections provide opportunity for the full expression of opinion by the voter upon even a single subject. There is seldom a chance for him to say more than "yes" or "no" upon what may be a complex question. Most frequently his opinion is not expressed upon a question at all, but upon a list of candidates whose individual opinions he is unlikely to know. If he did know them, he would probably find that the opinions of any candidate on some questions coincided with, and on other questions differed from his own.

As a statistical method, an election may be described as a voluntary self-recording of opinion by some members of the electorate upon a greatly simplified statistical schedule. Totals depend upon voluntary appearances by voters at polling places on a single date. There are no follow-ups, no recanvasses, a minimum of instructions and explanations, and no checks upon the understanding by the respondent of the questions asked. The tabulating process is a simple hand-count, without cross tabulation with other known data in ways customary in statistical machine tabulation.

The statistical method of election may be contrasted with the method of census. Censuses have usually been employed for the collection of objective data, but their use to collect subjective information is by no means rare, and they offer an alternative to the method of election as a means of summating opinions and attitudes. By the census method an approximately complete coverage of the universe is obtainable. Each individual, without initiative on his part, is approached by an enumerator and invited, or required under penalites for non-compliance, to answer the questions asked. These may be

elaborated where the issues in an election must be oversimplified. Trained enumerators may elicit more accurate formulations of opinion from some individuals than these would be able to construct for themselves independently.

An election will not provide an accurate summation of public opinion unless, by chance, the opinions of those who vote and the issues upon which they vote are representative samples of the opinions of all persons having opinions upon all pending issues. For example, it has been contended that the President holds the support of the electorate but that the latter is out of sympathy with certain New Deal policies for which he stands. This contention, if true, illustrates the unadaptability of the election method to the measurement of public opinion. It does not discredit the representative form of government or the use of elections to select public officials. Moreover, the method of election is in accord with our national traditions of individualism. The method of census is less "democratic" for it does not have the voluntary aspect of an election.

It is currently proposed that a national referendum election should precede our entrance into foreign war. According to this plan, if a majority of voters acquiesced all of the people might then be called upon to risk their lives and property, but not otherwise. It is assumed that the voters have competence, without special knowledge or educational preparation, to pass upon this question; also that the lives and property of non-voters and of an opposing minority may justly be put in jeopardy by the votes of the majority. Waiving these debatable assumptions, let us assume that in a matter of such consequence an accurate summation of opinion is essential.

For this purpose, the method of census is superior to the method of election. The census could reach some millions of people who would be directly affected by war but who would be ineligible to vote in an election. There could be specially trained enumerators, with a carefully prepared schedule or ballot, covering alternative statements of proposed public policy. These statements could be arranged upon a scale from the most belligerent to the most pacifistic. Items of information concerning the respondent himself could be obtained, such as sex, age, marital status, and whether or not a legal voter. Opinions could then be correlated with these items. For example, it could be ascertained whether the young men of 18 to 31 were more or less in favor of war than their elders, their wives and sweethearts, or other groups within the electorate.

All answers would be compulsory but confidential. Enumerators would be instructed to avoid suggestions that would influence the

replies, though they might make factual statements, officially authorized, which would serve as premises for the questions asked. Thus, the enumerators might state that a hostile air fleet was on its way toward our shores across the Atlantic. The official statement on following days could be revised in accordance with any change in the factual premises. The possibility of daily changes in the official statement introduces an uncontrolled and unfortunate variable into the census procedure. However, the absence of such an official statement would introduce an even greater possibility of bias, because of the variety of propaganda and other influences to which the respondents would be subjected.

A census of opinion on a proposed declaration of war would require considerable time, during which the prospective enemy might obtain military advantages; but this factor of time is also involved in the election method, to which alone I am offering the census method as an alternative.

The recent National Unemployment Census, despite its name, is a good illustration of the election method of measuring opinion, and of the contrast between that method and the method of census. It was believed by many students, including the present speaker, that only a true census—a door-to-door canvass by trained enumerators—would provide a relatively accurate account of unemployment in the United States. In part this belief was based upon the seeming impossibility of obtaining either a complete coverage of the unemployed, or a representative sample within the universe, by any other method. The belief was also based upon the need for information regarding the employment status of the entire gainfully occupied population, in order to interpret data pertaining to the unemployed part of the population.

The method of census, however, was rejected in favor of the method of self-registration, or election. In effect, the National Unemployment Census was a poll, in which all who wished to do so were given an opportunity to vote upon the question whether they were unemployed or partly unemployed. Their votes were recorded in answer to Questions 2(a) and 2(b) which were key questions on the schedule. Other, more objective inquiries, of which 2(c)—relating to emergency workers—is an illustration, were also on the schedule. To "get out the vote," many of the devices familiar in a political campaign were utilized. It is interesting to note, however, that the unemployment election approached as nearly as possible to the method of census, without actually employing that method. Ballots (Unemployment Report Cards) were distributed to every home in the country. The voting did not necessitate, as some had proposed, that the voters (the unemployed)

should apply at an election booth or similar place of registration.

Perhaps the chief scientific value of the National Unemployment Census will be the experience provided with the election method of obtaining data hitherto regarded as obtainable only through the method of census.

Straw votes may be obtained by either the method of election or the method of census, or by a combination of the two. The *Literary Digest* polls appear to have been of the election type, since, like the Unemployment Census, they rested heavily upon voluntary returns from mailed questionnaires. The *Digest* poll of 1936 appears to have illustrated the possibility of bias contained in the election method. Mr. Gallup, on the other hand, employs the method of a representative sample census. To the extent that he is able to master the problems of sampling which he encounters, his statistical findings may summarize American attitudes and opinions more accurately than do elections or any other method yet devised.

GOVERNMENT AND THE SAMPLING REFERENDUM*

By George Gallup
The American Institute of Public Opinion

During the past few years an idea has been developing in the field of journalism which has caught the imagination of students of social and governmental processes. It is the idea that public opinion—the opinion of the masses—can be ascertained at any time on a wide variety of social and political issues by means of the sampling referendum.

Public opinion is a societal force that spells power. What people think puts governments in and out of office, starts and stops wars, sets the tone of fashion and morality, makes and breaks heroes. It is understandable, therefore, why scholars are following new research leads in the opinion field with such avid interest.

It was not so long ago that the idea of the sampling referendum was generally unknown. James Bryce, the great Englishman whose mellow and penetrating insight gave us the classic volume, *The American Commonwealth*, was totally unaware of it when he wrote in 1888. "The obvious weakness of government by opinion," said Bryce, "is the difficulty of ascertaining it." The organs of opinion in America, he observed, are almost as numerous as the people themselves, "and they are all engaged in representing their own view as that of 'the people'." The only positive test to separate genuine public opinion from that which is counterfeit, Bryce pointed out, is to hold elections and submit specific questions to the popular vote. But this is not feasible, he declared, because of the expense. Inability to poll the electorate on questions of public policy, Bryce concluded, "is the first drawback to the rule of public opinion."

But even as Bryce wrote, the germ of an idea had been grasped by a few American newspapermen. As early as 1883, for example, General Charles H. Taylor, editor of the *Boston Globe*, was using the principle of sampling to speed up his reporting of election returns. He sent his reporters to representative precincts to gather early returns, and used the combined results as a sample of what the final count was likely to be.

In the early 1900's the newspapers began applying this idea of sampling to pre-election canvasses. The *New York Herald*, for example, polled 30,000 registered voters in New York City in 1904. The *Columbus Dispatch* and *Cincinnati Enquirer* commenced polling in 1906 and 1908, respectively, and since that time, with one or two exceptions, have conducted polls in every biennial election.

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

While the newspapers were the first to make practical use of the sampling referendum in reporting public opinion, it remained for the *Literary Digest* to bring the technique to the attention of the whole country. In 1916 this magazine discovered the possibilities of sampling referenda as vehicles for circulation drives. Beginning in 1920 the *Digest* periodically conducted nationwide canvasses on such questions as prohibition and the soldiers' bonus, and on presidential candidates. In these polls ballots were distributed to millions of people all over the nation, and the returns were liberally reported in the newspapers and over the radio. The *Literary Digest* made America conscious of the validity of the sampling referendum as a measure of public opinion.

As a general rule, political leaders gave little recognition to newspaper polls until 1932 when Mr. Emil Hurja joined the headquarters staff of the Democratic National Committee. An able political analyst, Mr. Hurja made careful studies of voting sentiment during the campaign, deriving much of his material from sampling referenda. I venture to predict that political strategists will pay increasing attention to systematic studies of public opinion and that, in the future, no party headquarters will consider itself completely staffed unless it is able to command the services of men who are expert in the technique of opinion sampling.

Until 1934, curiously enough, professional statisticians had little or no hand in the planning and direction of newspaper polls. The job was usually assigned to a hardpressed reporter who knew little about sampling; and, with some exceptions like the *Columbus Dispatch*, the *Cincinnati Enquirer*, and the *Chicago Journal*, the emphasis was placed largely on the promotional aspects of the poll. This latter flaw, as I shall point out later, was primarily responsible for the downfall of the *Literary Digest*.

During the period 1933–36, three trained research men, each from the field of advertising and business research, set out to design sampling referenda along statistically sound lines. The Fortune Quarterly Survey was developed by Paul Cherington and Elmo Roper, Jr. in 1935, and since that time the results of the Survey have appeared quarterly in *Fortune Magazine*.

Archibald Crossley developed his poll for the King Features Syndicate during the 1936 presidential campaign. Primarily an election poll, the canvass was not continued after the November balloting.

The American Institute of Public Opinion began experimenting with the problem of nationwide polling in November 1933. In October 1935, it started its series of weekly polls and, since that date, has been rendering an opinion news service to about sixty daily newspapers over the country with a circulation of several million readers.

It is evident that opinion polls have become an integral part of the American scene. The history of these surveys has been characterized by continued refinement of the sampling technique, by wider application from primarily election polls on candidates, to referenda on all manner of social and political issues, and by increasing public acceptance of the validity of their returns. Developed in the newspaper world, these sampling referenda have become an accepted technique of reporting. They are, in the language of journalism, a sort of fourth dimension for the Fourth Estate. Newspapers are today reporting not alone what men do, but increasingly, what men think.

What is the significance of this development? What will be the consequences for representative government?

The first observation to be made about sampling referenda is that they tend to make the mass articulate on issues of the day. The American Institute of Public Opinion calls its service "America Speaks." As we look at it, the Institute is a mechanism through which the mass or any group within the mass can vote their opinions on important political and social issues.

In making the mass articulate, the sampling referendum helps to define the mandate the group gives to its leaders. Bryce observed that while an election of governmental officers is a sort of indirect referendum, it is not a completely satisfactory way of delivering the public's judgment, because elections come only at fixed intervals; and, moreover, it is difficult to separate issues and men.

To take a concrete example: President Roosevelt was elected in 1936 by the largest popular plurality in the history of the country, carrying every state in the electoral college with the exception of Maine and Vermont. What did this vote mean? The President saw in it an unmistakable mandate for the full enactment of the New Deal. The principal obstacle was the Supreme Court. But in Mr. Roosevelt's judgment the 1936 vote for the New Deal was so overwhelming, that it constituted a mandate to circumvent the Court. Accordingly, on February 5, 1937, the President asked Congress to pass a law providing for the retirement of judges over 70 years of age, and the appointment of an additional judge, presumably pro-New Deal, for each old man who refused to step down. Was Mr. Roosevelt right in interpreting the 1936 victory as an authorization to change the Supreme Court?

The people themselves apparently had given no such mandate. Fortunately for historical purposes, the Institute has a complete series of sampling referenda on the question of Supreme Court change. These polls tell a very important story.

In September 1935, seventeen months before President Roosevelt

sent his message on the Supreme Court to Congress, the Institute asked a representative cross section of the American people this question: "As a general principle, would you favor limiting the power of the Supreme Court to declare Acts of Congress unconstitutional?" Sixty-three persons out of every 100 with views on the issue said "No," do not limit the power of the Court.

Fourteen months later, in November 1936, the question was put again: "Are you in favor of limiting the power of the Supreme Court to declare Acts of Congress unconstitutional?" Fifty-nine per cent of the voters now replied: "No," do not limit the power of the Court. But having said this, the voters then indicated their feeling that the Court should move a bit to the left, for when the question was put, "Should the Supreme Court be more liberal in reviewing New Deal measures?" 59 per cent of the people said "yes." It appears, therefore, that before President Roosevelt introduced his plan to change the Supreme Court the public wanted the "Nine Old Men" to be more liberal but they were against a major surgical operation on that body, such as limiting the power of the Court to declare Acts of Congress unconstitutional.

On the day President Roosevelt sent his Court message to Capitol Hill, the Institute set its nationwide sampling machinery into operation, polling the voters on the question: "Should Congress pass the President's Supreme Court plan?" First complete returns showed 53 per cent of the people voting in the negative. Thus, despite the tremendous personal popularity of the President, he started his court fight with a majority of the voters against him.

Every week throughout the dramatic battle over the Supreme Court, the Institute asked the voters the same question: "Should Congress pass the President's Supreme Court plan?" For a time, the Administration appeared to be slowly winning voters to its point of view. In March, when the fight was one month old, the count was 48 per cent in favor of the plan and 52 per cent opposed, a gain of one voter per 100 for the Administration. In early April the vote was 49 per cent in favor of the plan and 51 per cent opposed, another gain of one vote per 100 for the President. But there the anti-Court tide reached its crest.

Following the President's message on the Court, the Justices read a series of 5 to 4 decisions favoring the Administration. They upheld the abrogation of payments in gold; they reversed their decision on the Washington minimum wage law for women, and also declared the Railway Labor Act and the Mortgage Moratorium Act constitutional. Now the Wagner Labor Act was before the high tribunal for judgment. Everywhere the decision was awaited as the crucial test of the Court's

newfound liberalism. On April 12 the decision came. The Wagner Act, one of the most revolutionary laws ever passed by Congress, was declared constitutional. The Court had passed its test on the issue of of liberality. Evidently the "Nine Old Men" were not irreconcilably anti-New Deal.

From that point on, sentiment for Court change began to decline. Two weeks after the Wagner decision the Institute's count stood 47 per cent in favor of change to 53 per cent opposed, a decline of 2 per cent in the President's anti-Court following. Shortly thereafter, Justice Van Devanter resigned and opened the way for a Roosevelt appointee, whereupon the Institute's index of sentiment for Court change dropped 5 per cent, down to 42 per cent in favor and 58 per cent opposed.

In mid-June the Senate Judiciary Committee submitted an adverse report on the bill, and, after attempts at compromise by Senator Robinson and an extremely bitter debate in the Senate, the measure was finally rejected. All through the court fight President Roosevelt held stubbornly to his course, and the indications were that even now he was unwilling to concede defeat.

But the Court issue was dead. Witness the referendum conducted by the Institute early in September: "Would you like to have President Roosevelt continue his fight to enlarge the Supreme Court?" "No," 68 per cent. Only 32 per cent "yes." And witness the special referenda made among the constituents of Senators Burke of Nebraska, Wheeler of Montana, and O'Mahoney of Wyoming, three Democrats who led the fight against the bill. "Do you think the Senator was right in opposing President Roosevelt's plan to enlarge the Supreme Court?" the Institute asked of the voters in these three states. "Yes," 3 to 2, was the reply.

Since its founding in 1935, the American Institute of Public Opinion has continuously reported on the popularity of President Roosevelt and his program. While his standing with the people has varied from time to time, the President, the Institute has shown, has always maintained a majority, and for the most part an overwhelming majority. Yet despite his tremendous personal popularity with the people, they have not been willing to follow him blindly in every New Deal measure he has proposed. They were for the CCC, for social security, for wages and hours legislation; but they voted against the NRA and the AAA shortly before these laws were declared unconsitutional and, as I have described at some length, they steadfastly refused to go along on Supreme Court change. It is only by means of sampling referenda that programs can be separated from personalities and the mandates of the leaders defined.

The sampling referendum performs another function: it gauges the true strength of pressure groups that swarm in and out of Congressional halls.

Late in 1934, you will recall, there came out of the West a plan to end the depression. It was called the Townsend Old Age Pension plan and it proposed to give every person over 60 a pension of $200 a month provided he would retire from active labor and agree to spend all the $200 within a month after it was received. Congress rejected the plan by an overwhelming vote in the spring of 1935. But the Townsendites were not to be silenced that easily. They began organizing for political action. They formed Townsend Clubs all over the country, in every state and in most Congressional districts. They collected large sums of money for their war chest. It was their resolve to become the biggest and most powerful bloc of voters wedded to a single legislative project since the days of the Anti-Saloon League.

Dr. Townsend and his cohorts became increasingly vocal, and at his threats to crack the whip, Congressmen grew nervous and alarmed. Some Congressmen who had first opposed the Plan did a political somersault and wrote their pledges of support. Others made special trips to Washington during the off season to offer their cooperation. Would this fantastic movement sweep the country and force the hand of the national legislature?

The Institute, being an opinion news reporting service, set its nationwide staff of interviewers to work testing Townsend sentiment throughout the country. Of thousands of people in every walk of life it asked: "Are you in favor of government old age pensions for needy persons?" and "How much do you think should be paid monthly to each person?" The voters replied, 9 to 1, that they were in favor of old age pensions; but even in the hotbeds of Townsendism, such as Oregon, California, and Washington, the percentage of $200-a-month Townsendites was small. On the Pacific Coast only 16 per cent voted for this sum, and in the country as a whole only 3.8 per cent named the $200 figure.

It is interesting to me that the people of this country were sober enough to reject the Townsend plan by such an overwhelming majority, and also that this revelation of Dr. Townsend's strength was followed by a Congressional investigation and eventual collapse of the movement.

While we are discussing what happens when the mass is made articulate by means of sampling referenda, let me call your attention to one other poll which seems to me to be significant. For many years in this country the words "syphilis" and "gonorrhea" have been taboo.

Venereal disease has been regarded as a badge of shame, and victims of these ailments have either concealed their infection or gone to the other end of town to be doctored by third-rate practitioners. With possibly 10 per cent of the American people afflicted, venereal disease was in fact a great national menace. The efforts of public health authorities to combat this scourge were being blocked by a social taboo. Though they ran many stories about tuberculosis, most editors refused to print discussions of the cause and cure of syphilis and gonorrhea; and radio chains ruled the subject off the air. "Fear of offending the public through discussions of venereal disease," said Dr. Thomas Parran, U. S. Surgeon General, "is first and foremost among American handicaps in progress against syphilis."

In December 1936, the Institute, with some trepidation, took the issue of the venereal disease taboo to the public. "Would you be in favor of a government bureau that would distribute information concerning venereal disease?" it asked the voters. Also, "Should this bureau set up clinics for the treatment of venereal disease?" The answer? Ninety out of every 100 in favor of an anti-venereal disease public health campaign. This overwhelming vote plainly indicated that the public was in hearty sympathy with the movement led by Surgeon General Parran, and it is gratifying to observe that during the past year discussions of the social disease have been broadcast from our principal radio stations and carried in the columns of scores of newspapers. Who knows but that a sampling referendum several years ago might have shown the people eager for a public health campaign against venereal disease, and thus dissipated earlier the taboos that have held the movement back these years?

We have said that sampling referenda make the mass articulate, define the mandates of our leaders, reveal the true popular strength of pressure groups, and show social taboos quantitatively for what they are worth. Are there any dangers associated with this new mechanism? Public opinion is powerful; therefore measures of public opinion, widely accepted, carry power. What guarantee has the public of the honesty and impartiality of the organization running the sampling machinery? What guarantee have we that the returns from the sample are accurate and dependable? Does a political poll set in motion bandwagon tendencies that cause people to flock to the winner for the sake of being with the winner and without regard to the merits of candidates or issues? Are politically minded legislators who are trying at one and the same time to sit on the fence and keep both ears to the ground likely to be induced to follow the mob rather than do their duty and vote for the unpopular side if that is for the best interests of the country?

Let me say at once that I consider polls on issues of greater significance than polls on candidates. The latter undertaking provides a legitimate news story which has wide reader interest, and also serves the scientific purpose of testing the sample against official election returns. But the referenda on issues are by all odds the more important. Let us take up in turn the several arguments made against such polls.

What guarantees have we that polling organizations are honest and impartial? In my humble judgment we have a pretty realistic guarantee. The American Institute of Public Opinion is an opinion news reporting agency which derives all its income from the sixty-odd leading newspapers of the country which subscribe to its service. Editorially, these papers are of all shades of opinion. Some are left of center; some are right of center; and some are driving down the middle of the road. Now with a collaboration of this kind, how long do you suppose we would last if we were anything but honest? Furthermore, should any organization or party doubt the honesty and impartiality of opinion news furnished by the Institute, it can check on public opinion with samples of its own. To be dishonest in this business is to commit professional suicide, and I cannot imagine a situation where business necessities are more naturally conducive to plain, unvarnished honesty and faithfulness in the discharge of duty. Review the history of polls for the past thirty years as you will, and I do not believe you will find many cases of deliberate polling dishonesty, for the very reason that I have stated.

But you may say, granted honesty, what guarantee have we that your report is statistically reliable? And if it is unreliable, may it not become a tool of propaganda with the tremendous potency of mass suggestion? As you know only too well, there are no guarantees of dependability of a sample except statistical honesty and skill. If your sample is drawn in correct proportion from all classes in the opinion universe, and if it includes enough cases to bring chance variations within your limits of interpretation, and if the opinion you are sampling has not changed materially since you made your test, then your report is reliable.

Every poll involves some error, great or small, as a result of these factors. In the case of the *Literary Digest*, the shortcomings of method were revealed with great drama and fanfare. Here a poll widely hailed as "uncannily accurate," suddenly ran completely off the track, predicting a Landon landslide in the face of a Landon defeat more crushing than that ever suffered by an aspirant for the high office of President. Why? There is no mystery about it: faulty methods. Students of polls knew that, under circumstances such as those existing in 1936, the *Digest*'s face would, after the election, turn to a brilliant red.

With the exception of a few cities, the *Digest* sampled only owners of automobiles and telephones. It neglected for the most part the very poor and those with little purchasing power. Before 1936, political sentiment in the upper income groups was sufficiently representative of the whole voting population to enable the *Digest* to get by. But in 1936 the lines of political cleavage were severely drawn between the haves and the have-nots, and the income bias in the *Digest* sample resulted in a disproportionate number of Landon votes.

We ourselves underestimated Roosevelt's strength by an average of about 6 per cent per state. The reasons, we think, were two: first, sentiment was rapidly moving toward Roosevelt in the closing days of the campaign. Most of the ballots that entered into our final report were gathered before October 15. When we extend our state curves two weeks we find that, in a remarkably large number of states, the curves derived from the samples come close to the official division of the vote in the election.

Secondly, we under-represented the lower income groups in our sample. We studied the turnout of wealthy and poor wards in previous elections with great care, and set our quotas on this basis. But in 1936 the poor were aroused. They went to the polls in much greater numbers than in previous elections, and they were voting for Roosevelt. Our research had misled us in this respect.

Since 1936 we have made further tests of our methodology and have been gratified by the small margins of difference between our samples and official election returns. In the recent mayoralty campaigns, for example, we were only 4 per cent away from LaGuardia's official percentage in New York; and in Detroit, where the CIO was attempting to gain control of the city government, our margin of difference was only 2 per cent.

It should be borne in mind that an election is itself a sample, and conceivably, an unofficial poll can be more nearly representative of public opinion than an official election, due to the variability of turnout among different classes of voters.

In addition to official election figures, there are other indications that our samples are reflecting public opinion with a high degree of accuracy. I have already cited the results of our polls before the collapse of the Townsend Movement and the defeat of Roosevelt's Supreme Court plan. In 1936 the Institute showed Landon as the man most popular with his party's rank and file long before the Republican convention. During the sit-down hysteria early in 1937 our samples showed a declining public patience with the sit-down strike and revealed that the farmers were particularly opposed to this newest weapon of organized labor. It was at Hershey, Pennsylvania, you will

recall, that irate farmers descended on sit-down chocolate strikers and drove them from the plant.[1]

Sampling referenda, as I have pointed out, are subject to some error. We are laboring daily to improve our techniques, and, while there is much work to be done, experience shows that our sampling machinery is already performing in a highly satisfactory manner.

Now, what about the bandwagon influence of these polls? Do these referenda accelerate opinion movements in the mass and tend to substitute mob hysteria for reason? Our experience is too short and our techniques for determining cause and effect are too inadequate to render a positive decision, but in the past few years there have been some striking examples in which little or no shift of voters has followed publication of returns from samples or where the shift has been in the opposite direction, to that required by the bandwagon theory.

In the 1932 presidential campaign in Ohio, for example, the poll of the *Columbus Dispatch* indicated that Roosevelt would receive 65 per cent of the total vote to be cast in the state. If sampling polls influence public sentiment, the *Dispatch* returns should have been effective, for the paper has conducted a biennial poll in Ohio for the past thirty years, and is widely known throughout the state for the accuracy of its canvasses. Just before the election a second poll was taken which showed that Roosevelt's strength had dropped to 51 per cent of the total, the approximate figure he received in the official count. In Ohio in 1932, therefore, the evidence indicates that voters dropped off the bandwagon, rather than climbed on.

Again, in April 1936 the American Institute of Public Opinion reported 56 per cent of the Republican vote for Landon as the party's nominee for President. In the final report on May 31, just before the nominating convention, Landon's percentage had dropped microscopically to 55.4 per cent. The knowledge that Landon was the choice of the rank and file of the Republican party was widely spread, yet the measurement made by the Institute showed no bandwagon movement toward the Kansas governor.

In the 1936 presidential election, the surveys of the Institute gave Roosevelt an early lead and indicated that the President's strength increased in the closing weeks of the campaign. In this instance sentiment moved in the direction of the winner. But these data give little support to the bandwagon theory, because the *Literary Digest*, which enjoyed a wide following throughout the country, was forecasting a victory for Landon.

[1] The recent unemployment census furnishes another interesting comparison. The Institute found that 26 per cent of the persons who declared they were unemployed had failed to register in the voluntary census of November 16–20. The check-up sample taken by the government reported that 28 per cent of the unemployed had failed to register.

As a final example, the Institute's recent mayoralty poll in Detroit showed no shift in sentiment from beginning to end. The returns were printed daily in the *News*, the leading Detroit newspaper, yet no evidence of a bandwagon movement developed.

These examples do not prove conclusively that voters are unswayed by sampling referenda, because it can always be argued that the Hoover trend in Ohio, for instance, would have been more pronounced had it not been for the *Columbus* poll, or that Landon's preconvention strength would have trended downward had it not been for bandwagon recruits; but the instances cited certainly make a convincing case against the bandwagon theory. Perhaps voters are not herded so easily as some observers are led to believe. Possibly, even, sampling referenda stimulate minority voters to re-examine the rational basis of their position and reassert their principles with greater conviction. Future experience may give us a clearer answer to this problem.

What about the bandwagon influence among legislators? If polls on issues are continually taken, won't our representatives become puppets in the hands of pressure groups, and the true function of representation be lost? It is certainly true that sampling referenda give the people more power in government. Heretofore issues could be taken to the voters only by means of elections which are both slow and costly. Now, by use of sampling techniques, public opinion can be quickly and inexpensively sounded and the results communicated to the elected representatives of the people.

Under this system of frequent referenda, the function of representation is not lost, for it is well understood that the people have not the time or the inclination or the competence to pass on the myriad of governmental problems that confront their elected officials. Moreover, the democratic process requires leaders to initiate the means by which the values of the group are realized.

Before the days of sampling referenda, legislators were not isolated from their constituencies. They read the local newspapers; they toured their bailiwicks and talked with the man in the street; they received letters from back home; they entertained delegations claiming to be spokesmen for the majority or for large and important blocs of voters. The only change that is brought about by sampling referenda is that a technique is provided whereby the legislator will get a truer measure of public opinion than he has had in the past.

Advocates of a cause don't throw up the sponge when they find they are in a minority. On the contrary, if their conviction is strong, they labor, propagandize, recruit and educate, hoping that their views will become those of the majority. The Socialist party has for years polled only a fraction of the total vote, yet it has carried on election after

election. The periodic revelation of the numerical insignificance of the party has not prevented it from preaching doctrines which it later had the satisfaction of seeing enacted into law by one or the other of the major political parties.

We live in a democracy where the majority rules, where leaders are constantly being chosen by the people, and where the main lines of governmental and social policy are continuously being referred back to the people for their approval. This nation has become great under this democratic procedure, and so far, in a world threatened by dictatorships and totalitarian states, it has managed to preserve a very precious value called "individual liberty." I have faith in democracy, and my experience with the American Institute of Public Opinion only increases my respect for the confidence in the wisdom of the democratic process. When I look at Russia and Germany and Italy and Japan, and see their lines of national policy resolved by a few minds in the direction of war and conquest and regimentation of the individual, spiritually and materially, for the service of the state, I am more sure than ever that Theodore Roosevelt was right when he said:

"The majority of the plain people of the United States will, day in and day out, make fewer mistakes in governing themselves than any smaller group of men will make in trying to govern them."

STATISTICAL BIAS IN PRIMARY DATA AND PUBLIC POLICY*

By A. F. Hinrichs, *Chief Economist*
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THE DEVELOPMENT of public policy with reference to economic problems has subjected the statistical agencies of the Government to an almost unprecedented pressure. Inadequacies of the data have resulted in the demand for an expansion of basic information. For example, the Bureau of Labor Statistics enlarged its sample of manufacturing establishments reporting man-hours worked in one pay-roll period of each month from 10,039 firms employing 1,710,270 workers in January 1932 to 22,205 firms employing 4,565,266 workers at the present time. In terms of estimated total manufacturing employment, we received man-hour reports for 29.5 per cent of the wage earners in January 1932 and for 54.3 per cent in October 1937.

New types of analysis have been required to make basic data throw light on new problems that have become of public interest. Again, to illustrate from the field of employment statistics, it has been necessary to study the monthly reports of groups of establishments within the various industries as well as to compute averages for all establishments in the industry. Two such analyses have been published in the *Monthly Labor Review*—one dealing with changes in hours from 1935 to 1936 and another with changes in average hourly earnings.[1]

Finally, there has been an insistent and legitimate pressure to develop subdivisions of the data to focus available information on the problems of particular industries or localities. A government statistical agency has a primary obligation to its contributors to protect the confidential character of their returns, to Congress to live within its means, and to the users of its statistics to guard them against misuse of the data. But these three limitations still leave an agency such as the Bureau of Labor Statistics with some latitude for mining its data to effect their maximum usefulness.

When data collected and edited for one purpose are turned to a new use, however, the resulting special analyses are almost necessarily less accurate than the routine analysis. It is quite probable that more intensive editing is called for and more particularly that the new objective calls for editing instructions which it would have been wrong to apply for the routine analysis. Practically the re-editing of data al-

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 29, 1937.

[1] "Hours and Earnings Before and After the N.R.A." by Witt Bowden, *Monthly Labor Review*, (January 1937); "Average Hourly Earnings in Manufacturing, 1933 to 1936" by A. F. Hinrichs, *Monthly Labor Review*, (April 1937).

ready filed and often "cold" is impossible except for a hasty but critical inspection. It is inevitable therefore that special analyses, such as are constantly called for, subject the basic data to strains and stresses that they were never intended to bear. At times this may be in the order of a random error; it is quite likely to appear as a bias at one or the other extreme of the distribution.

There may have been a time when statistical data served an essentially academic interest and when it was possible to assume that the users of the statistical information would exercise a high order of critical capacity. It is still true that an agency developing primary data must impose on users the responsibility not to subject the data to uses not warranted by the sample, by the methods of collection, or by the methods of tabulation. Many times Government statistical agencies should and must furnish the best approximations to a complete description of underlying conditions that can be made within the limits of their resources. Good approximations carefully used shed real light on perplexing problems.

I can assure you that at the present time primary economic statistics are being used directly in the formulation of policy. I suppose academic research is still going on in this country. But the people who are coming to me to find out about our data are not academic. They are business men, labor leaders, members of Congress concerned with formulating policies that involve action. What limitations attach to the use of the cost of living index in the adjustment of wages? How do wages paid in the manufacture of wooden furniture compare in Pennsylvania and North Carolina? How many people will be affected if a 40-hour law is enacted? How do we explain our employment and pay-roll figures; can they be accepted as representative by a manufacturer whose back-log of unfilled orders has fallen off but who would like to keep his force together by producing to inventory? Don't our wholesale price series mean that it is necessary to attack administered prices and monopoly? We do not attempt to formulate policy ourselves, but we are glad of an opportunity to aid those who are trying to translate our figures into policy.

This is more especially true because when they are misused in the formulation of public or private policy, when some interest finds itself endangered by that misuse, the statistical agencies of the government are attacked. We of course welcome the pressure for new data and more complete analysis. I also welcome as both necessary and healthy the vigorous criticism to which our work is at times subjected. It means the continuous improvement of our work at a more rapid rate than would be the case were the data not subject to the continuous fire of practical application.

One of the most difficult problems which a government statistical agency faces is the selection of materials which shall and shall not be published. As you all know, there is no such thing as a perfect statistic; but with the rigorous observance of sensible definitions, with the careful development of a balanced sample within a measured universe, it is possible to produce results with so small a probable error that its presence may be safely disregarded. At the other extreme, there are cases in which the data are so obviously inadequate that it is wiser to avoid their publication. To stick to the field of employment statistics, as an illustration, the sample of establishments engaged in the manufacture of cement covers 93 per cent of the wage earners in an industry whose boundaries can be quite definitely established. The manufacture of cement tends to be concentrated in specialized establishments and does not raise the problem of classification that one encounters in attempting to distinguish between firms engaged in the production of cotton textiles and rayon cloth, for example. Similarly man-hour reports are received for 89 per cent of the estimated number of employees in blast furnaces, steel works, and rolling mills. On the other hand, we tabulate but do not publish separately the average hourly earnings and average hours worked in millinery where we believe that our sample is so small as to make the man-hour data seriously inadequate. In the case of turpentine and rosin, inadequacies of the sample have forced us to discontinue all employment figures for the industry. These two contrasting extremes cause us little difficulty. In the first two cases the data are safe almost irrespective of the use to which they are to be subjected; in the third and fourth, the obvious inadequacies of the data mean that officially we have no information. But in between these extremes there are large numbers of cases in which the data should be published but must be used with extreme care. We should not sacrifice the dissemination of information merely because its use for some purposes is subject to serious limitations. For example, in connection with our employment statistics, we do publish average hourly earnings for women's clothing and men's furnishings, even though the man-hour sample covers less than 30 per cent of the indicated number of wage earners in these industries and even though we know that the sample may be in some respects a selective one.

For many purposes the bias of a selective sample may be unimportant. For other purposes, the disregard of a selective bias may mean the abuse of the data.

The statistician and economist has an important mission to fulfill, however, if statistical agencies are not to be forced to the dangerous alternative of publishing only what purports to be fool-proof data. It is our duty to work night and day to level up the quality of our weaker

series and to tighten up the least critical analyses. We should be constantly criticized for our inadequacies. But we must have help in educating the users of statistics or statistical analyses to discriminate.

A figure that has been estimated by a government agency tends to be regarded as "right," not merely as the best approximation which the data permit. Frequently statistical bias, i.e., a consistent type of error, is present in such approximations. But I plead for the usefulness even of such approximations, if their limitations are recognized. For example, it would cost several million dollars to discover exactly how many wage earners work more than a 40-hour week. It would have cost much more than the Bureau's budget permitted to re-edit our employment reports in order to eliminate from a count of establishments all those atypical situations in which, for example, only watchmen were employed during the pay-roll period. Should we have said that we have no information when we received a query: How many establishments and how many workers in manufacturing are working more than a 40-hour week? Or did we shed useful light on the subject, when we retabulated our individual employment reports for May 1937 to find that about two-fifths of the workers in our man-hour sample were in that half, perhaps, of the establishments in which the average hours worked for all persons on the pay roll was more than 40.0 hours per week? I know that the former figure is biased downward. The establishment figure may be biased upward; I know only that it is subject to several biases, both negative and positive.

The layman is suspicious of statistical estimates with notes on bias and error. I have talked with intelligent laymen who have insisted that there is no information on the subject of hours of work. They would gladly have accepted a figure of 42.4—or of 18.9—per cent, if only it could have been quoted as purporting to be completely right and authoritative.

We economists and statisticians are partly responsible for the layman's alternating distrust and blind acceptance of all figures. Burgess' article in the December issue of this JOURNAL should be as trite as this paper of mine. The sad fact is that we are the people who abuse each other's work. I have never yet talked to a Congressman who wanted more than a margin of safety in using an estimate: tenths serve many of his purposes quite as well as tenths of a per cent, and he knows it. The business man knows that data cannot be perfect. Every day he develops from his own experience approximations to facilitate his approach to vital problems of his business. He knows that his accounts are merely approximate; that the depreciation allowance is a guess, and obsolescence a hunch. Occasionally he is too insistent that government statistics meet standards that cannot be

achieved, but by and large, he accepts the fact that perfect accuracy is impossible. If he complains of some misuse of our data, he asks only that they be rendered more fool-proof. But with all the pomp and ceremony of the higher calculus and a language designed to perpetuate the priesthood, doctors of philosophy often forget to look behind the published figures to discover whether the final digit is significant or is merely published because there is not room in the table to indicate the range within which the value probably falls.

Let me take just one example from the field of wholesale prices. In 1935 a memorandum on *Industrial Prices and Their Relative Inflexibility* was published as a Senate Document. (74th Congress, First Session, Senate Document No. 13.) In its broad outlines it was an extremely illuminating document, and has focussed attention on the problems of social and economic policy incident to inflexible prices. Its author did not attempt to include in it a technical appraisal of the only price series which were available and which he would be the first to admit vary in accuracy as measures of particular price changes. I am just wondering whether automobile prices are being discussed in the fourth Round Table this afternoon! I am sure that there the discussion will be discriminating. But many of those who jump from this Senate Document to the attack, apparently fail to recognize that neither the author of the memorandum nor, I believe, the Department of Agriculture was responsible for its publication. It was intended for study in connection with the development of broad lines of policy. It therefore presumably included rough edges which would have been eliminated in developing a document for widespread public use.

The automobile industry feels abused when it is knuckled with one of the roughest of these. On page 8, there is a list of industry groups contrasting drops in price and production from 1929 to 1933. Agricultural prices declined 63 per cent while production declined 6. Let me cite two of the contrasts presented. Motor-vehicle prices are said to have dropped 16 per cent and production 80 per cent; cement prices dropped 18 per cent and production 65. There was certainly an uncritical use of our prices in this contrast. In the case of cement, we price a standard product from six producing areas which are the same in 1937 as they were in 1926. In the case of motor vehicles, we tend to compare the price of a streamlined, all metal, 85 horsepower car in 1937 with that of a Model "T" Ford in 1926. In the one case it was accurate to say that the price of cement decreased by 18 per cent from 1929 to 1933. One may carry the contrast over even a longer period and say that its price in June 1937 was 4.5 per cent less than the average price in 1926. But in the case of passenger automobiles one must say rather that it was possible in June 1937 to buy a fleet made up of various 1937

models produced by Buick, Cadillac, Chevrolet, Dodge, Ford, and Packard for the same price that one would have had to pay for an equal number of cars in 1926. I have not the faintest idea whether this means that automobiles are reasonably or unreasonably priced. Over short periods we know their prices to be relatively inflexible. Over long periods we have always admitted our ignorance of everything except the relative price that a man had to pay for an automobile in 1926 and in 1937. That we do know. We have never pretended to know quantitatively whether the car ran more miles with less upkeep, whether it used more or less gasoline and oil at a given speed, whether it would go twice as fast and, if so, how safely and comfortably.

No one in the world has yet devised a standard car value. The Bureau is continuing to work with the industry to find a more consistent measure of use-values than a name plate. The automobile industry uses wheel-base and horsepower as two of their approximate measures of value to the consumer. The industry also uses retail price per pound of car as a means of checking price policy against cost factors. They have produced an index of the retail prices per pound of car from 1929 to date. Similarly, they have compiled an index of the costs of raw material purporting to be weighted according to the quantities of the materials used in car manufacturing and also an index of factory wage rates per hour. I am unable to vouch for the accuracies of the computations or to appraise all the limitations of these indexes. It is significant, however, that while our wholesale price index of passenger automobiles fell 13 per cent from 1929 to 1933, the index of retail prices per pound of car appear to have decreased 25 per cent, while material costs decreased 37 per cent, and wage rates per hour 12 per cent. Comparing the year 1933 and 1936, they find no increase in the price per pound of car, a 24 per cent increase in material costs and a 27 per cent increase in factory wage rates. Our index of passenger car prices advanced 3.8 per cent.

You may well ask, as the automobile people have, why one publishes an index of automobile prices. We have published each month since the automobile figures were added to the wholesale price series in 1927 a longer title than is used for any other item: "Passenger cars, weighted, average price of Buick, Cadillac, Chevrolet, Dodge, Ford, and Packard, f.o.b." The method used in compiling the index has always been described in detail to users who have inquired. The listed f.o.b. prices for the various models of each make are treated through a simple average. These simple averages are weighted in accordance with the registrations of the make during the corresponding Census year for which other weighting factors are devised. We have used the same weights since 1934, and in the case of automobiles these are average

registrations in the Census years 1929 and 1931. We are now adding a footnote in the *Wholesale Price Bulletin* to the effect that: "The index is computed by dividing the aggregate weighted value for models priced currently by the aggregate weighted value in the base period (1926) for models current in 1926." If that warning still proves inadequate and we cannot discover a more satisfactory technique of measurement, it may be necessary to discontinue publication of this figure.

But bad as the relative price for automobiles is from the point of view of comparing 1926 and 1937 values and prices, the discontinuation of such figures would represent a step backward in our price work. In 1926 our index was subject to the valid criticism that finished goods prices were under-represented. The revision in 1927 extended the list of average prices from 404 to 550 commodities. Another revision in 1931 brought the list to the present number of 784 commodities. We need to go forward to the improvement of our index as a measure of long time changes in the level of wholesale prices. It ought not to be necessary to retreat from acknowledged imperfections in the technique of historical analysis, that will after all sustain a considerable margin of error without invalidating its broad usefulness, to a technique that gives poorer results over the short run.

From month to month our method of pricing automobiles is valid. From year to year it may conceivably be better than the "weight" basis. The elimination of weight without loss of strength might be represented as a distinct improvement from the consumer's point of view. From October 1936 to October 1937 our passenger car index advanced 8.0 per cent, while the Automobile Manufacturers Association figures show an increase of 10 per cent on a wheelbase index, of 12 per cent on a pound basis, and of 15 per cent on horsepower. The objection to our index for automobiles is not that it seriously misrepresents changes over short periods of time from any point of view; but that cumulatively its bias eventually results in nonsense from some points of view, notably when it is used to appraise pricing policies and costs of the elements of production or to appraise use-values.

The Bureau has as its first objective the publication of a general index of wholesale prices that will reflect from month to month the changes which are taking place. I wish to call your attention merely to the movements which occurred from the summer of 1936 to the present time to justify this broad and short-run objective. If you will further examine over this period the movements in raw material and finished goods prices, imperfect as these indexes still are, I think you will agree with me that the Bureau's wholesale price index is one of the most important measures for current economic analysis which we possess. As to the quality of the general index, I quote from Dun and Brad-

street, Inc., announcing on December 8, 1937, the discontinuation of their two indexes of wholesale prices, one of them the oldest in the country:

> The decision to discontinue these two indexes was based on the belief that their service to the public had been fulfilled. . . . The Index Number of Wholesale Commodity Prices, compiled by the Bureau of Labor Statistics, United States Department of Labor, Washington, D. C., has been constructed in accordance with the most recent improvements in technique. Now available weekly, this index has a more representative coverage, and employs weights in closer alignment with the current significance of the commodities involved.

As a by-product of serving our primary objective, we possess materials which are capable of reflecting broad changes in the level of wholesale prices across long periods of time, and individual price series which measure changes in the prices of particular commodities across both short and long periods. It has always been part of the Bureau's policy to publish the components of this index so that the limitations of the total index may be appraised and so that statisticians will have available the basic data required for special computations and analyses.

The index has been revised on many occasions and is undergoing fundamental revision at the present time. We were fully aware in 1927 of the difficulties which would attach to the measurement of wholesale prices of many fabricated articles subject to changing specifications. On the whole, we feel extremely gratified with the results. To a larger extent each year we are working out with the industries involved detailed standard specifications for the items to be priced.

In passing, let me note that even on basic commodities one must admit new specifications, if wholesale prices are wanted which relate to the current market. For example, corn was priced for many years on the No. 2 white which I believe is still the standard specification on the futures exchanges. Actually, however, less than 2 per cent of the corn sold is No. 2 white. The Bureau, therefore, dropped prices on No. 2 white and is pricing No. 2 yellow and No. 3 yellow. It is not difficult with a series of that sort to secure as long a period of overlap as may be desired to establish a normal relationship between the price of a commodity meeting one specification and that of the one meeting the new specification.

Even in the case of clothing we are able to price standard commodities and to change specifications only after overlapping data have been accumulated. This does confine our prices to relatively standard items such as men's blue serge, with quotations for the 13-ounce serge on the 3-piece suit and for the 15-ounce serge on the 4-piece suit. Until recently there was a lack of detailed specifications in underwear but

we believe that this problem has been solved for the next few years in cooperation with the Underwear Institute. Because of the general adequacy of our textile price series, we can evade the problem presented by women's dresses which we do not attempt to price at wholesale.

I have not time to appraise all of our series. But let me call your attention to the fact that comparative prices for a few items are maintained through the confidence of manufacturers. Several manufacturers assign a new model number which is priced up or down rather than frankly stating that the price of the old model has been changed. We have been advised to carry the new prices without adjustment. Where the old model has been discontinued and a fundamentally new model has been introduced, they have worked out with us an appropriate allowance for cost change so that the two series of prices may be tied together.

This leaves us with a surprisingly long list of our 784 commodities which either are priced to constant specifications since 1926 or to changed specifications with long enough periods of overlap so that the index of price may be regarded as representative of long periods of time. For most items our problem consists in being sure that we are pricing an adequately representative list of items.

But it follows as a matter of course, as we subdivide our materials into separate price series, that we emerge with a number of series which are weaker than the all-commodities index or than the index for any major subgroup. Over long periods of time the biases inherent in some of the individual series are likely to become so serious as to make it improper to use them in isolation. The presence of such biases even distorts the general index for historical comparison, but we believe not so seriously as it would be distorted from month to month and from year to year were we to omit entirely certain types of product.

Finally let me relate the problems of the wholesale price index to the need for conservatism in revising price indexes. You have probably all of you criticized our present cost of living index based on 1917–19 weights. You point to the growth of the popular use of automobiles and radios, neither of which is included in our present indexes. We have completed the basic field work and tabulations that are prerequisite to reweighting this index, I am glad to say. But I must add that I am thankful we never had the headache of pricing radios during their period of rapid evolution, nor do I wish to see new commodities included in any price index until they emerge from the first period of surging development and have become relatively standardized at least from one year to the next. I at least want to take my biases in amounts that I can assimilate!

Here then is the question I wish to leave with you: Shall government agencies try to exploit their materials to the limit? Shall we frankly indicate the limitations of the data but push their use so long as the margin of error is permissible within the special use to be made of the data? Or shall we retreat to the point where the data can hardly be misrepresentative, no matter what the use to which they are put? It's a long retreat and will draw the shades of night over large segments of our economy that have at least come out into the twilight. Public opinion may decide the issue, but it is likely to be guided by the restraint we statisticians and economists exercise in vending our services. The world cannot be saved by enthusiasm. I doubt that even selfish interests are well served through the abuse of data. As Burgess remarked, the essence of statistical economic analysis remains: "Grub —grind—graph—and guess."

I plead for the value of materials on which guesses are properly made after adequate grubbing. Let me remind you again that the degree of accuracy called for depends upon the problem in hand. Precisely because people so often insist upon using figures without regard to their limits of accuracy, the Bureau has found it impossible to develop an estimate of unemployment. In some connections a five per cent error might be quite serious. But for many purposes, as in the formulations of the broad outlines of public policy, an estimate accurate within even ten per cent would do. It has never been useful to quarrel about precisely how many persons were unemployed. It has been terribly necessary to concentrate all our attention on the broad lines of policy that would be indicated almost equally well by any carefully constructed estimate.

I hope for the day when bias and error will not be terms of opprobrium, but will be recognized as attaching in greater or less degree to every statistic. We can make progress in spite of the presence of small, consistent, and cumulative errors in our data: i.e., of statistical bias. We must at times accept it as inevitable. But it should be appraised by every user, and use of the data should always be limited to problems in which the indicated margin of error is permissible. Even when appropriately used, the reader should be warned of the character of the error. If we ourselves are careful enough, we may expect to get across to the lay mind the distinction between statistical bias and biased statisticians.

The staff of the Bureau of Labor Statistics is at your constant service to explain the limitations of our data. Our doors are open at all times to those who will help us in the improvement of our materials.

SOME MEASURES OF CHANGING LABOR PRODUCTIVITY AND THEIR USES IN ECONOMIC ANALYSIS*

By David Weintraub[1]
W.P.A. National Research Project

The Works Progress Administration's National Research Project has undertaken a study of changing industrial techniques as they relate to changes in employment and unemployment. During the time at my disposal it would be impossible to do more than suggest the wide range of statistical material with which we have been working, and I have therefore restricted this discussion to a group of questions related to measures of labor productivity.[2]

The data are preliminary and should be regarded merely as examples illustrating in each case a different type of analytical problem which required the construction of either a special measure of productivity or a measure for a special segment of an industry or both. The examples have been selected to show the need for detailed statistical data in order to throw light on relationships which are obscured by over-all statistical series.

For illustrations I have drawn from the work materials and preliminary reports of various sections of the Project's work.[3] Detailed statements concerning the methods used in constructing the several series will eventually become generally available with the publication of the forthcoming reports.

MECHANIZATION OF A PRODUCTION PROCESS

My first illustration is drawn from the bituminous coal industry and is intended to illustrate some relationships between the mechanization of the coal loading process and the amount of labor required per ton of coal mined underground. A study of the effects of technological changes on production and employment in the bituminous coal industry has to take into consideration not only its own competitive fields of production with their competitive wage structures, prices, transportation costs, union and non-union fields, nature and degree of mechanization, but also the competitive fuels of oil, gas, and water power. Such a study is now indeed being made.[4] This study recognizes

* A paper presented at the Ninety-ninth Annual Meeting of the American Statistical Association, Atlantic City, New Jersey, December 28, 1937.

[1] In the preparation of this paper I was assisted by E. J. Stone and H. Ober.

[2] For a statement of the general approach to the Project's assignment, see Irving Kaplan, *The Research Program of the National Research Project*, (W.P.A. National Research Project, August 1937).

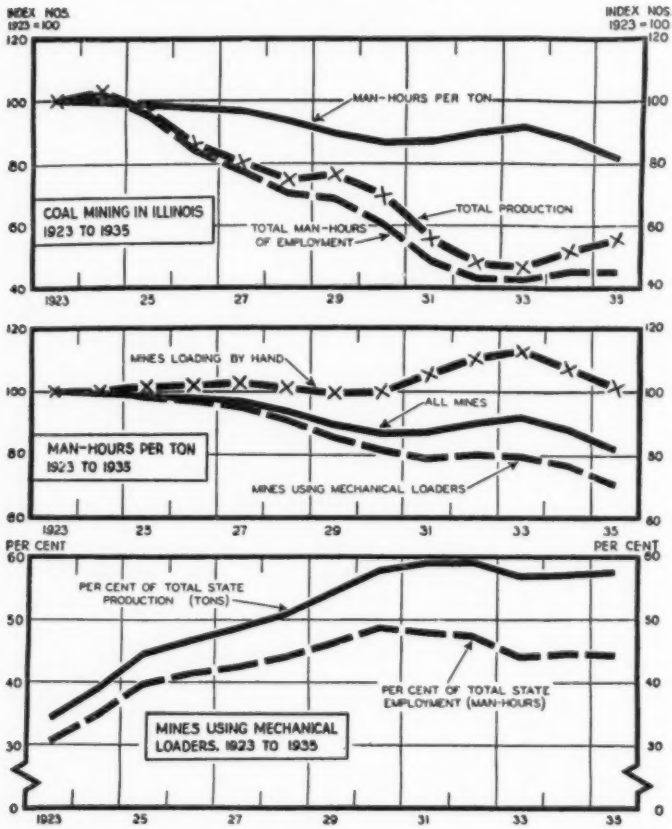
[3] The research work of these sections is under the supervision of Irving Kaplan, Associate Director of the Project.

[4] Under the direction of F. G. Tryon. This is one of a group of studies undertaken by the Project in cooperation with the U. S. Bureau of Mines, with O. E. Kiessling of the Bureau in charge.

all the factors just mentioned, and more, as analytical points of departure. In order to throw light on the effects which these factors have on the industry, the available factual material has been tabulated accordingly.

CHART 1

MECHANIZATION OF A PROCESS AND PRODUCTIVITY
(3 year moving averages)



During the past dozen years or so, mechanization of the coal loading operation has become an important problem in the industry. The installation of these labor saving devices results not only in greater output per unit of labor, but brings about considerable changes in the operation of the entire mine, effects a more minute division of labor, and though it may not result in a reduction of the total number of workers employed, it frequently requires changes in the type of personnel in order to obtain workers more adaptable to the new tempo of

operations. It was therefore desirable to analyze the production, employment and productivity data, where possible, separately for mines which had installed the loading machines and mines which had not.

Chart 1, based on statistics for the State of Illinois, shows in the upper panel that between 1923 and 1929 production declined 22 per cent and man-hours worked 32 per cent. Further declines since then have resulted in 1935 figures of production which were 42 per cent below 1923 and of man-hours which were 55 per cent below. The differences between the relative reductions in output and employment represent increases in productivity, which, when measured in terms of man-hours required to produce a ton of coal, amounted to 19 per cent between 1923 and 1935.

There is no doubt that this decline in the labor required per unit of output reflects the progress of mechanization of the loading process. This can be observed in the center panel of the chart. The solid line again represents the average man-hours of labor required to produce a ton of Illinois coal. It covers all underground mines in the State. The upper line represents a similar measure for all those mines which continue to load by the old hand process. There was practically no change from 1923 to 1935. The lower broken line on the other hand shows a decline of about 30 per cent. This line represents the average man-hours of labor required to produce a ton of coal in those mines which had mechanized the loading of 30 per cent or more of their output between 1923 and 1935. It should be noted also that it is these mines which in the general drop of Illinois coal production lost less than their share both in output and in employment. The lines in the bottom panel show that in 1935 the mines which installed mechanical loading equipment produced 58 per cent of the coal and used 44 per cent of the man-hours, as against 34 per cent of the coal and 31 per cent of the man-hours in 1923. These lines include all of these mines for the entire period 1923–35, regardless of the date of the installation of mechanical loading equipment.

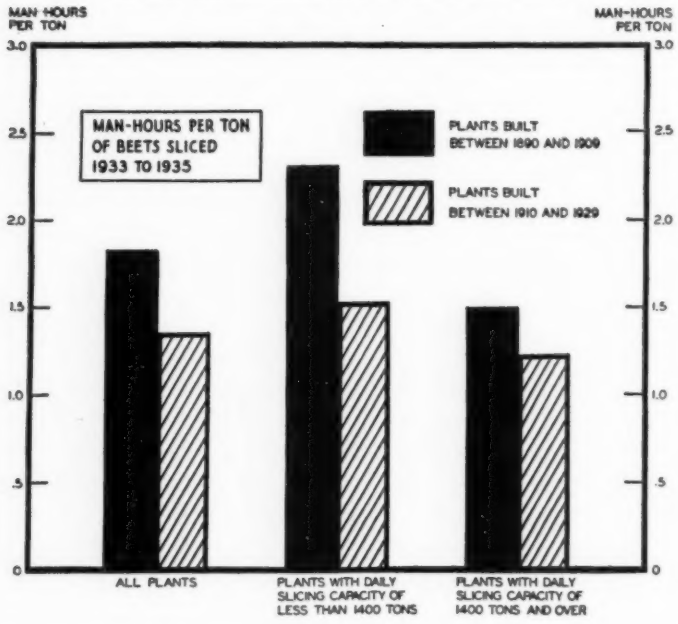
It cannot be said, of course, that the decline of 30 per cent in the unit labor requirements measures the labor saved by mechanical loading, or that the mines which have not installed the loading equipment could all economically do so. It should be clear, however, that no analysis which must confine itself to the over-all statistics shown in the top panel could even begin to grapple with the problems of the Illinois coal industry, and that a fuller understanding of these problems requires detailed statistical data and the construction of productivity measures as well as other measures, all designed with reference to the specific analytical problem at hand.

SIZE OF PLANT

The next illustration concerns the relationship between size of plant and labor requirements per unit of output. It is drawn from the preliminary results of our study of the beet sugar industry.[5] A feature of the beet sugar industry is its universal practice of operating plants at full speed and 24 hours a day during what is termed the "campaign" period, i.e., from the time the first beets are received from the fields until the entire supply is exhausted some weeks or months later. Thus

CHART 2

LABOR REQUIREMENTS AND SIZE OF PLANT



plant size or plant capacity in this industry is properly expressed by a measure of average daily operations. We have chosen the number of tons of beets sliced as our measure of operations.

Chart 2 was prepared from a cross-classification of the 1933–35 average campaign labor requirements per ton of beets sliced in each of the 66 plants in our sample. The chart shows man-hours used per ton of beets sliced in plants of varying size and age. It is clear that the older plants used more labor per unit of raw material consumed than the newer plants and that the smaller plants used more labor than the larger ones.

[5] The study was done by Raymond K. Adamson and Miriam E. West under the direction of Harry Jerome and William A. Neiswanger. It is one of a group conducted by the Project in cooperation with the National Bureau of Economic Research, Inc.

We know from other information that in this industry large size of plant is associated with low unit cost of production. For the purpose of determining employment prospects in the industry, we therefore wanted, among other data, information on the present trends in plant construction and plant mortality according to the size and age of plant. Although we have some data indicating that the abandoned plants have been smaller than the average size of operating units, such other information as we have leads us to conclude that the increase in the size of plants over the past 20 years has been due more to a gradual improvement in capacity in all plants than to the erection of new large plants and abandonment of old small ones. From another study on methods used in the raising of sugar beets,[6] we also found that there was a pronounced tendency toward the adoption of trucks for hauling beets to the factory. This meant that one factory could economically receive the product of a larger farm area, and was therefore impelled to increase its slicing capacity. Further, an analysis of machinery and equipment installations suggests that the past 20 years have been characterized more by the perfection of existing methods and the adaptation of precision control of operations than by technical changes of an order necessitating the construction of new plants.

PER CENT OF PLANT CAPACITY PRODUCED

In the discussion of the beet sugar industry, it was pointed out that the industry operates its factories either at capacity or not at all. This is of course the case in very few industries.

In the brick manufacturing industry,[7] among others, we found it necessary to determine the ratio of output to total capacity in order to interpret the movement of labor requirements per unit of product. The upper line on Chart 3 represents an index of average man-hours utilized per 1000 bricks produced in the plants covered by our field survey. Productivity has been declining since 1925. The major cause of the decline seems to have been not deterioration in equipment or technology, nor a major change in the nature of the product, but a decline in the per cent of capacity produced, represented by the line on the lower part of the chart. Clearly, there is an inverse relationship between unit labor requirements and the degree of capacity produced. When unit labor requirements are adjusted for changes in capacity produced they become the third curve on this chart, which indicates that, for our sample of the industry, the man-hours needed to produce

[6] Loring K. Macy, Lloyd E. Arnold, Eugene G. McKibben, and Edmund J. Stone: *Changes in Technology and Labor Requirements in Crop Production: Sugar Beets*, (W.P.A. National Research Project, August 1937).

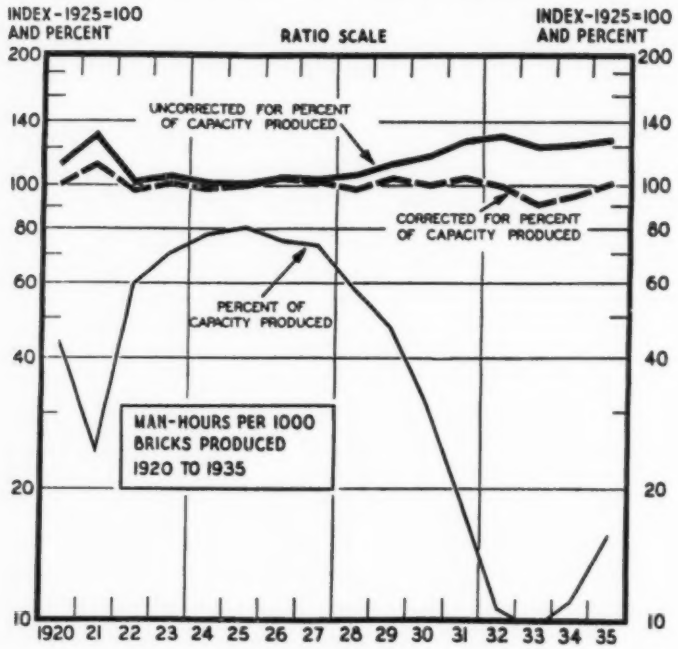
[7] The materials for this discussion were taken from a preliminary report on a study, conducted in cooperation with the National Bureau of Economic Research, Inc., prepared by Miriam E. West under the direction of Harry Jerome and William A. Neiswanger.

1000 bricks remained approximately constant throughout the period.

This correction was necessary in order to permit us to examine the net effect of changes in plant methods and equipment and management. We found that if these plants had operated at reasonable proximity to capacity in 1935, they would have used about as many hours of labor per unit of product as they did 15 years ago. Secondly, we found that, in the case of the brick industry, employment and

CHART 3

LABOR REQUIREMENTS AND PER CENT OF CAPACITY PRODUCED



production practices are such that the relation of output to capacity is of overwhelming importance to an evaluation of employment prospects: under the present circumstances, an increase in output would be accompanied by a very much less than proportionate increase in man-hours of employment.

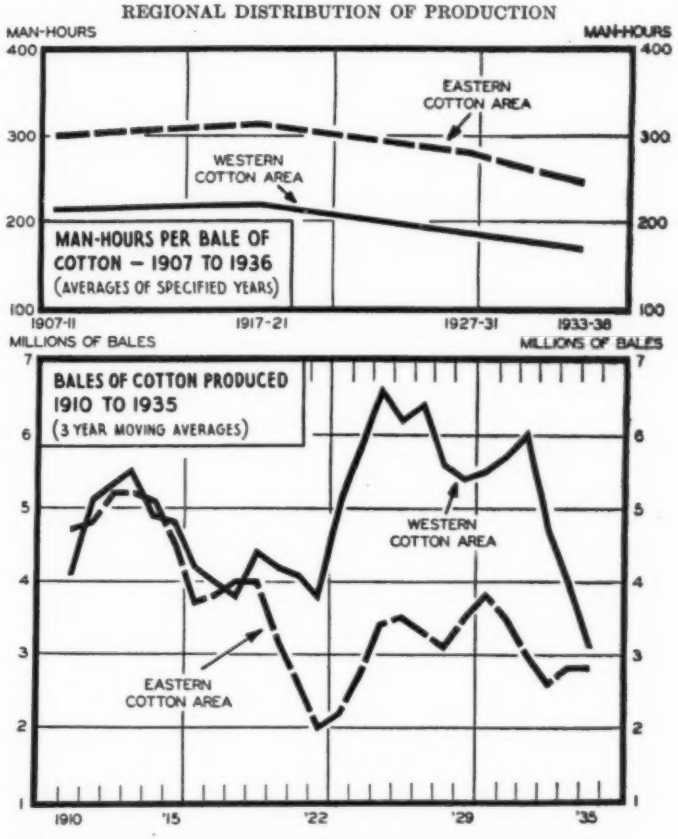
REGIONAL DISTRIBUTION OF PRODUCTION

Another problem frequently confronted in productivity analysis is represented by regional differences in the absolute level, or the direction or rate of change, of man-hour requirements per unit of product. Such differentials are frequently concealed by over-all data, yet have important implications from the point of view of employment prospects in given localities.

As an illustration, production and unit labor requirements for two important cotton producing areas are plotted on Chart 4.[8] The two upper lines, which represent man-hours per 500-pound bale of cotton produced, exhibit a fairly constant absolute differential. Throughout the quarter-century, the western area (the States of Texas and Okla-

CHART 4

REGIONAL DISTRIBUTION OF PRODUCTION



homa) has used substantially less labor per bale than the eastern area (the States of Alabama, Georgia and South Carolina). The two lines on the bottom of the chart show cotton production in the same areas during the same periods. Production in the western area jumped about 40 per cent between the 1917–21 and the 1927–31 periods, and even in 1933–36, when affected by droughts and the A.A.A., it was only slightly below its 1907–11 level. In the South Atlantic states, on the other hand, we see a steady decline in total output, amounting

[8] The materials for this discussion were taken largely from a study prepared by William C. Holley and Lloyd E. Arnold. The study is one of a series on changing techniques and employment in agriculture, conducted under the supervision of John A. Hopkins.

by the end of the twenties to more than 20 per cent and by 1933–36 to about 35 per cent.

There are, of course, a great many factors which contribute to the differential in productivity. A few of these may be pointed out. In the first place, farms in the western area are considerably larger than in the eastern area and use larger, more efficient equipment and use it more extensively. By and large, western farms do not need to be fertilized, while the cotton crop in the old South, grown on depleted soil, is a heavy consumer of commercial fertilizers. Again, rainfall in the western area is relatively low; consequently hoeing and cultivating are less often required than in the eastern area, where these operations continue to consume large quantities of hand labor.

Finally, there are important differences in labor requirements for harvesting. In the western area the cotton bolls ripen more nearly at the same time and one or two pickings are common practice, whereas in other sections two or three pickings are necessary. Also, cotton in the southwest is snapped off, boll and all, rather than picked from the boll, as in other areas. This means substantially faster harvesting.

Because there are differences in the quality of the harvested product and differences in various cost elements, such as hourly wages, one may not conclude that the competitive advantage of the western area is measured exactly by the relation between the two lines on the top of our chart. And although the boll weevil, soil erosion, relative profitability of alternative crops and a number of other factors have influenced the shift of cotton production from the East to the West, there is no question that the difference in labor requirements is an important element accounting for the diverging production trends.

CHANGING COMPOSITION OF TOTAL PRODUCTION

The last illustration concerns the problem of constructing a measure of productivity in an industry in which the composition of its composite product changes. Few industries produce a single standardized product. Some produce several major products and, in addition, minor products or by-products. A productivity measure for such an industry should take not only this fact into account but the even more important fact that the proportions which the several products constitute of the industry's total production keep changing.

Chart 5 illustrates this point.[9] The physical volume of production of the automobile industry is almost always measured in terms of the number of cars produced or sold.[10] However, the available employment

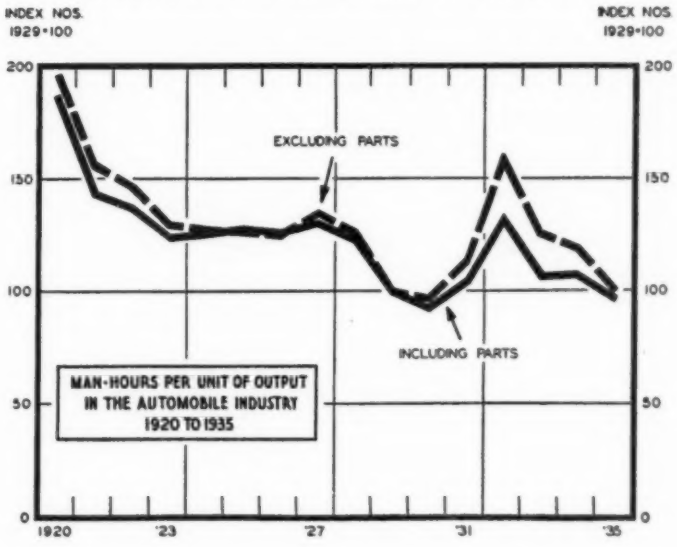
[9] The data for this chart were prepared by Leo Genzeloff and are taken from one of a group of productivity studies, based largely on secondary sources, which the Project is conducting with Harry Magdoff in charge.

[10] This measure is sometimes weighted for the number of open and closed cars, trucks, busses, etc.

statistics for the industry include, besides those engaged in the manufacture of cars, those engaged in the production of parts. Unless the ratio between the production of cars and parts remains approximately constant, the index of productivity is bound to be distorted by this change in the composition alone. In order to keep the example clear, I am here passing over some rather fundamental problems concerning the several sizes, price classes, functional and other differences of automobiles. The fact is that in most years the ratio between the production of parts and cars is fairly constant, with parts fluctuating between

CHART 5

PRODUCTIVITY AND COMPOSITION OF PRODUCTION



12 and 16 per cent of the total dollar value. During the depression years, however, the production of parts rose to more than a quarter of total production. Unless this factor is taken into account, the productivity measures for depression years are considerably distorted, as evidenced by the spreading of our curves in these particular periods.

The corrections shown on the chart are by no means the most important corrections that must be made in order properly to represent the changes which took place during the period. Without a detailed field study it cannot, for instance, be determined what if any effect the consolidation of companies and the integration of production had on labor requirements; or what the influence was of reduced operation during the depression; or the effects of changes in certain production processes; etc. Unfortunately, we have not found it possible to make such a study in this industry.

CONCLUSIONS

In presenting these illustrations I have either implied or explicitly stated that over-all measures of productivity obscure many economic factors which operate in the respective industries and consequently do not permit meaningful analysis of the factors which make for productivity changes unless some way is found to get below the over-all figures and at the many relationships which control the when, why and how of technological changes. Our Project has conceived of technological change as a problem which cannot be studied apart from its context of historical and economic relationships. These relationships cannot, however, be observed or derived from over-all statistics. It was only in the Bureau of Mines' files on extractive industries that we found sufficiently detailed information, covering a long enough period of years, to permit reasonably appropriate analyses. In most other instances it therefore became necessary to arrange intensive field studies and to collect data based on individual plant histories.

The problem which presents itself when we attempt to interpret the movement of a productivity index which covers a group of plants within a single industry becomes of course much more complex when the index covers a composite group of industries and represents a sector of the economy, such as agriculture, or manufacture.

Our industrial economy is characterized by the continuous growth and decline of industries, services, occupations; by the depletion of old and tapping of new resources; by the rise of new centers of economic activity and the haunting ghosts of old ones. This is true in the mining industries, it is true of the manufacturing industries, and in agriculture and transportation. While some of the story is evident even from an inspection of over-all figures, it is only a detailed analysis which makes possible more precise statements concerning the incidence of these industrial changes, their effects in terms of places and people, and their probable future course.

My thesis therefore is that a study of the effects of technological changes must wherever possible get below the over-all labor productivity measures. Only so is it possible to evaluate the effects of those elements which, when analyzed, may help to interpret movements in the over-all series and to evaluate trends and prospects of employment in various industries, occupations and regions.

I have illustrated this thesis with selected examples of interrelationships which are of analytical importance in particular industries. It is impossible to understand the fluctuations of productivity in the brick and tile industry without considering the degree of capacity utilization; in cotton culture, regional differences in size of farm, topog-

raphy, soil fertility, and climate result in different productivity levels and diverging production trends; an interpretation of productivity changes in coal extraction must take into consideration the differences in kind and degree of mechanization as well as the physical conditions of the mines; and so forth.

Technological change, then, cannot be posed as simply a question of machines versus men. The term "technological change" must be interpreted to include not only machines which do work done yesterday by men, but also machinery, equipment and instrumentation which do more work than men were able to do yesterday, or which do work that men could not do yesterday. It must include non-mechanical changes involving the management of production and labor, the flow and organization of work, and such structural changes as the integration and consolidation of plants, the development of new and competitive products, resources and areas.

As technological change cannot be dissociated from related aspects of the economy, so the technologically unemployed man cannot ordinarily be labeled. Technological developments not only assume different forms but have different effects on employment and unemployment according both to general economic conditions and to the specific economic conditions surrounding the occupation, industry or area affected. Measures of changing productivity are only one of the tools used by the Project. These measures help us to throw light on the effect of changing technology on the security of employment and the incidence of unemployment. As new industries and new plants come into being, while others contract their scale of operations, and still others shift their location, these industrial changes leave groups of workers jobless in one industry or area and expand the demand for labor in another part of the economy or country, or they change the nature of the job specification for employment at particular tasks and so impose occupational adjustment on workers.

The failure of our economy to provide full and remunerative employment for all those willing and able to work, while millions live at the bare subsistence level, constitutes the major problem of our day. Productivity measures have a place in the study of this problem and serve to throw needed light on the effects of changing technology.

SOME RECENT RESULTS IN POPULATION ANALYSIS*

By Alfred J. Lotka, *Assistant Statistician*
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PHENOMENA EXHIBITED BY THE POPULATION AS A WHOLE

The study of quantitative demography or population analysis can be undertaken from two points of view or by two methods—the empirical method and the rational or formal method.

The rational method is *possible* through the fact that between the various demographic characteristics there exist certain necessary relations, that is, relations imposed by the laws of physics or the laws of logic.

But the rational method is not only possible, it is *indispensable* if we wish to obtain an entirely satisfactory understanding of population phenomena. Undoubtedly the ideal process is to cultivate both methods side by side. According to our predilections, the empirical data will then be for us concrete illustrations of the abstract principles that mainly interest us; or, on the contrary, the formal relations will serve us as guides in the examination and interpretation of the empirical data which, in that case, will be our fundamental interest.

In what follows, it is proposed to indicate briefly a few examples, among more recent developments, to illustrate the relation between the two methods.

We shall begin by considering a few fundamental types of population, somewhat idealized and yet representing conditions such as are approached in some actual populations. The three types which we will consider are the stationary population, the Malthusian population, and the logistic population in relation to actual populations.

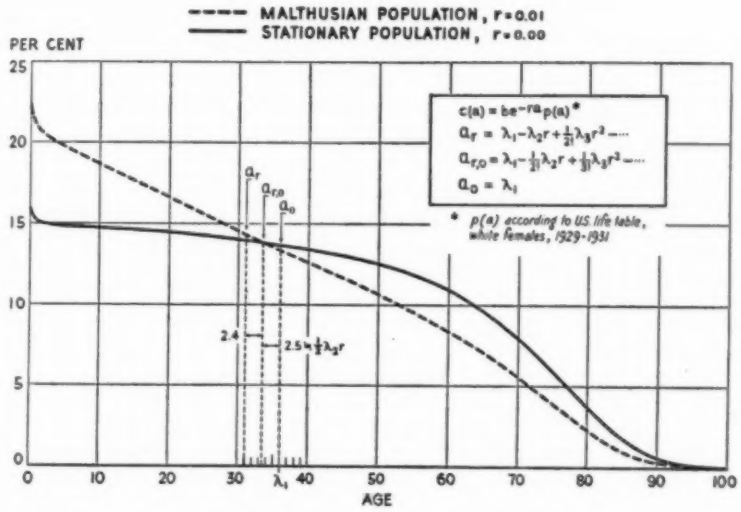
In the chart, Figure 1, there have been plotted two curves of age distribution, first, one corresponding to the stationary population on the basis of the mortality of white females in the United States 1929–1931; and, second, a corresponding age distribution curve, computed on the basis of the same mortality table, but with an assumed constant rate of increase of 1 per cent per annum. Certain points of geometric interest about these curves call for attention. A vertical line has been drawn through the point corresponding to the average age of each population, and a third vertical has been drawn through the point of the intersection of the two curves. The feature to which I wish to draw attention is that to within small quantities of second and higher order the line through the point of intersection lies halfway between the two

* Paper presented at the International Population Congress in Paris, July, 1937.

verticals. It can, in fact, be shown that the distance between these verticals is, in close approximation, given by $\frac{1}{2}\sigma^2 r = \frac{1}{2}\lambda_2 r$, where σ is the standard deviation of the life curve about its mean and r the rate of increase of the Malthusian population.

If instead of drawing the curve for the Malthusian population corresponding to a rate of increase over 1 per cent, we drew a succession of curves of this type with successively diminishing rates of increase, we would obtain a nest of curves, the left hand portion of which would

FIGURE 1
AGE DISTRIBUTION



be located at successively lower levels while the right hand portion would be at successively higher levels, as we pass from greater to lesser values of r. This is merely an illustration of the fact that a rapidly increasing population has a relatively high proportion of young persons, and that this proportion of young persons diminishes with a diminishing rate of increase in the population. The general character of these curves may be described by saying that each is produced from the one immediately preceding by a *tilting* movement about a certain point. We may ask what that point is. It can be shown that the *instantaneous center of tilt* as we pass from one of these curves to one immediately following (corresponding to an infinitesimal change in r) is located at the point corresponding to average age of the population. As we pass from curve to curve, this center of tilt moves somewhat slowly from left to right, within relatively narrow limits. So, for example, if we start with a curve corresponding to a rate of increase of

$r=0.01$ and extend the process until we are dealing with a curve with a rate of increase of $r=0.00$, then the instantaneous center of tilt will be found to have moved from age 31 to 36.

These may at first sight seem to be merely interesting geometric properties. They have, however, a practical bearing. The fact that the center of tilt lies in the neighborhood of the average age of the population implies that, as we pass from greater to lesser values of r, the natural rate of increase, the proportion of the population comprised within the age groups at the young end and at the old end of the curve of the population change materially, but the age group or groups centered about the average age of the population, i.e., essentially the group of productive workers, undergoes relatively small change.

TABLE I

AVERAGE AGE OF THE POPULATION IN UNITED STATES

	1880	1890	1900	1910	1920	1930
1. Males	25.30	26.29	26.93	27.79	28.62	29.89
2. Females	25.01	25.91	26.47	27.27	28.11	29.69
3. Malthusian	24.70	25.46	26.35	27.34	28.38	29.41
4. Malthusian	24.06	24.79	25.67	26.96	28.38	30.17

Note: (1) and (2), Observed values. (3) Values calculated on the basis of (a) the value of r corresponding to the year in question according to the logistic curve of increase in the United States; and (b) the life table for white females, 1919–1920. (4) Values calculated in the same way, but based on a life table as close as possible to the year in question.

While we have recognized these features as special characteristics of the Malthusian age distribution it will be seen from Table I that on the one hand the average age of the actual population of the United States has tended to approach that of a Malthusian age distribution corresponding to the prevailing rate of natural increase; on the other hand, Table II shows that the proportion of persons comprised within

TABLE II

POPULATION OF AGES 20–49 AS PER CENT OF TOTAL POPULATION, UNITED STATES, 1850–1930

Year	1850	1880	1890	1900	1910	1920	1930
Actual	38.6	40.0	41.2	42.2	44.0	43.9	44.0

the age group 20 to 49 years in the actual population has varied only rather slowly, the extreme limits being 38.6 per cent in 1850 and 44.0 per cent in 1930, an increase of 5.4 in the course of 80 years.

The Malthusian type of population, being that which prevails when the rate of increase of the population is constant, may be quite closely approached when the rate of increase of the population has been ap-

proximately constant for some time. There are several instances of actual populations of this type recorded in the literature. One of these,

TABLE III

MALTHUSIAN POPULATION
AGE DISTRIBUTION, BIRTH RATE, DEATH RATE AND RATE OF NATURAL INCREASE, PER THOUSAND

Age groups	England and Wales, 1871–1880					
	Male		Female		Both Sexes	
	Calculated	Observed	Calculated	Observed	Calculated	Observed
0– 5	142	139	135	132	138	136
5–10	118	123	114	117	116	120
10–15	107	110	104	104	106	107
15–20	98	99	95	95	96	97
20–25	88	87	86	91	87	89
25–35	150	144	148	149	149	147
35–45	117	112	117	115	117	113
45–55	84	84	87	87	86	86
55–65	57	59	63	61	60	59
65–75	29	31	36	35	32	33
75–∞	11	12	13	15	12	13
Birth rate b	36.47	36.92	33.74	33.72	35.08	35.28
Death rate d	22.16	22.61	20.01	19.99	21.07	21.27
Rate of increase r	14.31	14.31	13.73	13.73	14.01	14.01

Age groups	Germany, 1891–1900		Sweden, 1910	
	Both Sexes		Both Sexes	
	Calculated	Observed	Calculated	Observed
0–10	244	244	218	218
10–20	198	198	185	192
20–30	164	170	155	156
30–40	134	131	129	125
40–50	105	101	107	102
50–60	78	78	86	88
60–70	50	51	65	66
70–80	22	23	40	40
80–∞	4	5	15	13
Birth rate b	35.90	36.2	—	—
Death rate d	22.01	22.3	—	—
Rate of increase r	13.89	13.9	—	—

the population of England and Wales in the period from 1871 to 1880, is exhibited in Table III, taken from one of my earlier publications (1907), together with the correspondingly computed Malthusian ideal type. A similar example was later given by Bortkiewicz (1911), namely the population of Germany in 1910, and quite recently another example by Cramér, namely the population of Sweden in 1935.

These examples lend a certain practical interest to the Malthusian type of population. However, even if no actual case of this type had been observed anywhere, it would still be of serious importance, because it is towards a particular Malthusian type, the "stable" type, that any population, starting from any arbitrary age distribution,[1] would converge, if it were subject to a regime of a constant age schedule of fecundity and mortality.[2]

In the case of a population which has actually attained the stable form, the corresponding stable rate of natural increase is known by direct observation. In any other case it can be found only by computation.[3] In a certain sense this stable rate of natural increase is a purely hypothetical quantity. It possesses no value for purposes of prediction, since the conditions (fertility and mortality) which are assumed constant in its computation, will in actuality rarely be constant. However, in another sense the stable rate of natural increase is anything but hypothetical. It is a very real measure of actually prevailing conditions. If this stable rate of natural increase has a negative value, we know that the existing conditions of fertility or mortality, or both, must be improved if the population is to escape eventual annihilation. The stable rate of natural increase is thus recognized as the measure of an intrinsic quality of the existing population; hence the alternative name "intrinsic rate of natural increase" for this quantity ρ.

In its essentially quantitative application the intrinsic rate of natural increase may be replaced fairly satisfactorily by the "Boeckh index" favored by R. Kuczynski, or by the "replacement index" of W. S. Thompson, much used by F. Lorimer. These two measures possess the advantage of being a little easier to compute, although the difficulties of the computation of the intrinsic rate have at times been exaggerated. It is true that the computation of ρ requires a few min-

[1] Provided only that the age composition of this population were not wholly abnormal, as for instance if it were made up wholly of individuals of one sex, or of individuals beyond the age of reproduction, etc.

[2] The author takes this opportunity to correct a faulty enunciation of this principle which has crept into the literature. The principle has been formulated in the words: "a population constantly subject to the same mortality and with a constant rate of increase must *ultimately* become stable, that is to say, have a stable age composition, a stable birth rate and a stable death rate with a constant rate of increase." The fact is that the conditions explicitly stated are insufficient to enable one to make any prediction regarding the further development of the population in question. If we supplement the enunciation in order to render the prediction determinate (by adding the condition which is implicit in the original context, that the population in question is to be subject not only to a constant life table, but also to a constant age schedule of fertility), then it is futile to say that the population will *ultimately* converge to the stable form, for under these conditions it can have none other than the stable form from the start. See A. J. Lotka, *Journal of the Washington Academy of Sciences*, Vol. 27 (1937), p. 299; and *Human Biology*, Vol. 9 (1937), p. 104.

[3] Based on statistics not only of mortality but also of fertility.

utes[4] beyond that of the Boeckh index R_0 (which incidentally is obtained as an intermediate result whenever ρ is computed). But if these few minutes are spent on the extra work, it must be remembered that an additional result is obtained which has the advantage of being directly comparable to the crude rate of natural increase, the crude birth rate and the crude death rate. Furthermore, the particular interest of the intrinsic rate of natural increase lies in the fact that it plays a very important role in a whole system of intertwining demographic relations, as I have set forth in detail in a forthcoming monograph.[5] Among other things it leads directly to an intrinsic birth rate and an intrinsic death rate, which in many cases will differ materially from the corresponding crude rates; of these intrinsic birth rates and death rates the Boeckh index R_0 gives us no indication.

Those who favor the use of the Boeckh index have sometimes remarked that an approximate value of the intrinsic rate of natural increase can be obtained by dividing $1-R_0$ by the mean length of generation. But it is only fair to draw attention to the fact that this idea dates from the year 1925, the time of the publication of a fundamental article on the intrinsic rate of natural increase. Neither Boeckh, in 1886, nor any of his disciples since had ever suggested this idea or recognized its implications.

The logistic population

While, as has been shown, actual populations have on several occasions rather closely approached the Malthusian age distribution, it is quite evident that in actual fact, especially in modern times, the idealized type which would most closely correspond to an actual population must be of a different character, for it must allow for the characteristic downward trend of the birth rate among the civilized nations. In point of fact, the third idealized type of population, namely that based on the logistic growth curve, has been found in one example at least to fit very well indeed the age distribution of a population, namely the native white female population of the United States in 1920, the only case for which the somewhat laborious computations have been carried out. Figure 2 illustrates this case and shows that we have here indeed a very acceptable fit.

That the logistic type of age distribution should be found to fit very acceptably the population of the United States, at any rate so far as

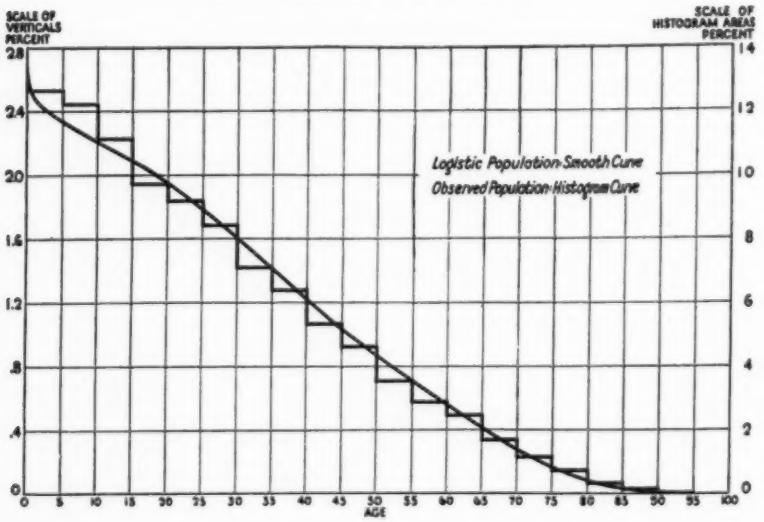
[4] One of my assistants, using a computing machine, carried out the additional steps in eleven minutes.

[5] A. J. Lotka, *Théorie analytique des associations biologiques.* Deuxième partie—Analyse démographipue. Hermann et Cie. Paris.

it is native born, is not surprising, considering that until recently, that is until the date of the last census, 1930, the population of the United States has in its growth followed rather closely the logistic curve. Since that date the growth curve of the United States has deviated quite appreciably from the logistic curve, as shown in the chart, Figure 3. This chart, however, really gives an inadequate idea of the extent of the departure, even though we have used an insert drawn on a magnified scale to bring out recent deviation from the logistic. This deviation is brought into much greater prominence when we compare, not the

FIGURE 2

AGE DISTRIBUTION IN LOGISTIC POPULATION COMPARED WITH NATIVE WHITE FEMALE POPULATION OF U. S. 1920.



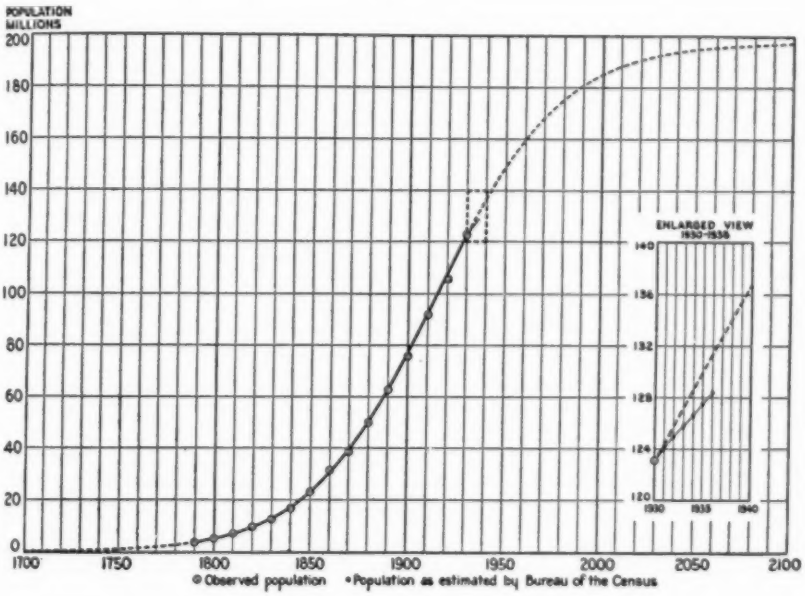
number of the population, but the annual number of births, as computed according to the logistic, and as actually observed. To this comparison we shall now proceed.

At a former Congress on population, six years ago, I indicated a method by which it is possible to compute for a closed population growing by the logistic law, on the basis of suitable mortality data, the corresponding curve of annual birth rates. Let me now present a diagram indicating a modified mode of procedure by which, not the curve of the birth rates, but that of the annual births is obtained. If over the whole stretch of time under consideration mortality had been constant it would be a relatively simple matter to compute the course of the annual births corresponding to the logistic curve of growth of the population. So, for example, if the regime had remained unchanged

as of the year about 1840, the annual births would have followed essentially the course indicated by the uppermost curve in Figure 4. Similarly had the process taken place entirely under the regime of the mortality of about 1871–1880, the course of events would have been essentially that represented by the second curve from above, etc. Actually, the process has proceeded under the regime of successive mortality

FIGURE 3

LOGISTIC GROWTH CURVE APPLIED TO THE POPULATION OF THE UNITED STATES AND COMPARED WITH THE POPULATION ACCORDING TO CENSUS DATA, 1790–1936



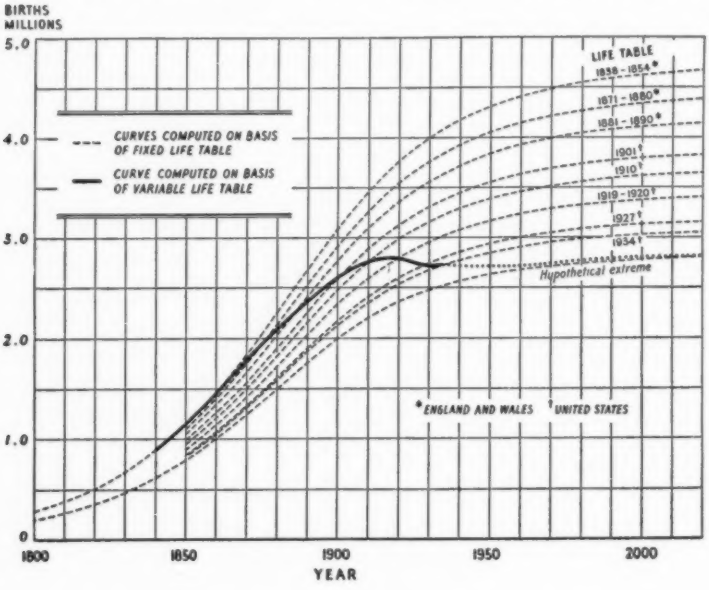
rates, and the corresponding annual births, if the population had grown entirely by excess of births over deaths, would have been essentially that represented by the heavily drawn curve which crosses the nest of approximately parallel curves.

An inspection of the heavily drawn curve so obtained brings out an interesting feature. At a certain part of its course, after attaining a maximum about the year 1918, the curve drops downward slightly for several years. The reason for this temporary dip is that the curve of annual births has been computed for a series of mortalities improving from year to year, and improving very rapidly in the recent past, with the result that the curves drawn on the basis of recent mortality tables are situated at successively lower levels. However, there is a

limit to what we may hope to accomplish further. It is not likely that the mean length of life can be increased much beyond 70 years. The lowermost curve, inserted to complete the diagram, and not by way of prophecy, has been drawn on the basis of a hypothetical[6] life table corresponding to a mean length of life of 70 years. The continuation of the curve of annual births beyond 1934 is indicated in Figure 5 by the

FIGURE 4

ANNUAL BIRTHS COMPUTED FOR A CLOSED POPULATION GROWING ACCORDING TO THE LOGISTIC LAW WITH THE CHARACTERISTIC CONSTANTS OF THE UNITED STATES, AND ACCORDING TO SEVERAL LIFE TABLES



dotted curve. This curve represents the lower limit which cannot be crossed by the annual births in a closed logistic population, so long as the mean length of life remains limited to 70 years.

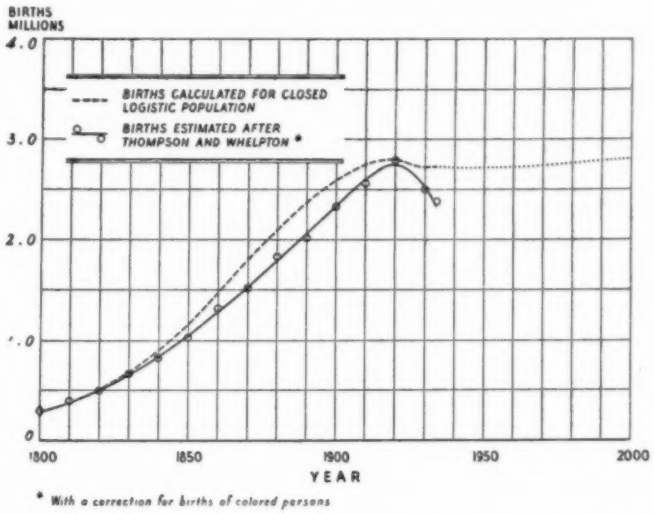
Such would be the course of the annual births in a logistic population possessing certain of the fundamental characteristics of the population of the United States, but growing exclusively by the excess of births over deaths. Actually the evolution of our population has followed a different line, more particularly in that it has received very notable accretions by immigration. Let us then examine how the actual course of events compares with the curve of annual births in a closed population growing according to the logistic law.

[6] According to Louis I. Dublin and Alfred J. Lotka, *Length of Life—A Study of the Life Table* (New York: The Ronald Press Company, 1936).

The official statistics of births in the United States is of relatively recent origin. It dates only from 1915. However, on the basis of the enumeration of children under 5 years of age in decennial censuses, making due correction for deaths, it is possible to obtain an approximate estimate of the annual births. This is the method employed by W. S. Thompson and P. K. Whelpton,[7] the results[8] of which are indicated by the small circles in Figure 5. The points so plotted have been

FIGURE 5

COMPARISON OF "ACTUAL" ANNUAL BIRTHS IN THE UNITED STATES (AS ESTIMATED BY THOMPSON AND WHELPTON) AND CURVES COMPUTED FOR A CLOSED LOGISTIC POPULATION



fitted by the graphic method with a curve shown in full line in the drawing. The curve of dashes in Figure 5 is a direct copy of the curve of logistic births of Figure 4.

It will be seen that about the beginning of the nineteenth century, the curve of actual births (as estimated by Thompson and Whelpton) fuses with that calculated on the basis of the logistic law. Then comes a period up to about 1920 where the curve of actual births falls a considerable distance below that calculated according to the logistic law for a closed population, which is entirely proper since in actual fact immigrants from abroad have added their numbers to the accessions

[7] Population trends in the United States 1933, page 262.

[8] Thompson and Whelpton's results were, however, for the present purpose, modified by the inclusion of an estimate of colored births, which were not included in the figures of these authors. Also, the number of births for the year 1934 (the last point on the curve in Figure 5) was obtained by a special calculation based on actually registered births; in other words, this particular point is based on more recent data than were available to Thompson and Whelpton at the time they made their estimates.

to the population by births. In late years immigration to the United States has been arrested, and quite recently immigration has actually given way to slight net emigration.

The significant feature strikingly brought out by the diagram is that at the period when the logistic curve of births exhibited a gentle downward dip, the curve of actual births has shown a very sharp decline, and this at the very time when immigration not only touched the zero mark but became a negative quantity.

A little while ago, when we inspected the curve of population growth, we found that since 1930 it had deviated on the short side of the logistic curve, but the deviation in that case began only in 1930, was relatively slight and we had to use an insert drawn on a magnified scale to show it clearly. There is no need of any magnification of the curve of births to show the very strong departure from the logistic which has taken place.

Differential growth rates: The employable age groups

In a population in stable age distribution, all the elements increase at the same per cent rate, and the relative proportion of the several age groups is constant. In the logistic population, on the other hand, older age groups increase more rapidly than the younger, in fact, the

TABLE IV

RATE OF INCREASE OF POPULATION IN EMPLOYABLE AGE GROUPS IN RELATION TO RATE OF INCREASE OF ENTIRE POPULATION, UNITED STATES, 1850 TO 1950

Year	Population, thousands, by Age			Population ages 15–69 as per cent of total	Average annual per cent increase in population from preceding entry			Ratio col. (6) / col. (5)
	All ages	15–69	Under 15; also 70 over		All ages	15–69	Under 15; 70 and over	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1950*	141,098	100,458	40,640	71.20	.604	.533	.782	.88
1945*	136,962	97,851	39,111	71.44	.697	.853	.317	1.22
1940*	132,350	93,849	38,501	70.91	.757	1.241	−.335	1.64
1935†	127,521	88,365	39,156	69.29	.774	1.354	−.383	1.75
1930	122,775	82,761	39,920	67.46	1.614	1.980	.944	1.23
1920	105,711	69,085	36,477	65.44	1.494	1.508	1.482	1.01
1910	91,972	60,034	31,769	65.39	2.102	2.535	1.386	1.21
1900	75,995	47,891	27,903	63.19	2.135	2.340	1.798	1.10
1890	62,622	38,811	23,649	62.14	2.486	2.916	1.762	1.17
1880	50,156	30,049	20,107	59.91	3.008	3.197	2.738	1.06
1870	38,558	22,768	15,785	59.06	2.263	2.511	1.964	1.11
1860	31,443	18,198	13,194	57.97	3.558	3.787	3.222	1.06
1850	23,192	13,199	9,979	56.95				

* Estimated on basis of age schedule of mortality and fertility as of 1934.

† Estimated from births, deaths, and migration.

youngest age groups actually diminish; there is in consequence, a continual shifting in the proportion of the several age groups.

In the actual population of the United States, a similar shifting of the age groups has occurred, with certain important consequences. In

FIGURE 6

COMPARISON OF ANNUAL RATE OF INCREASE OF THE TOTAL POPULATION AND POPULATION AGES 15 TO 69 IN THE UNITED STATES

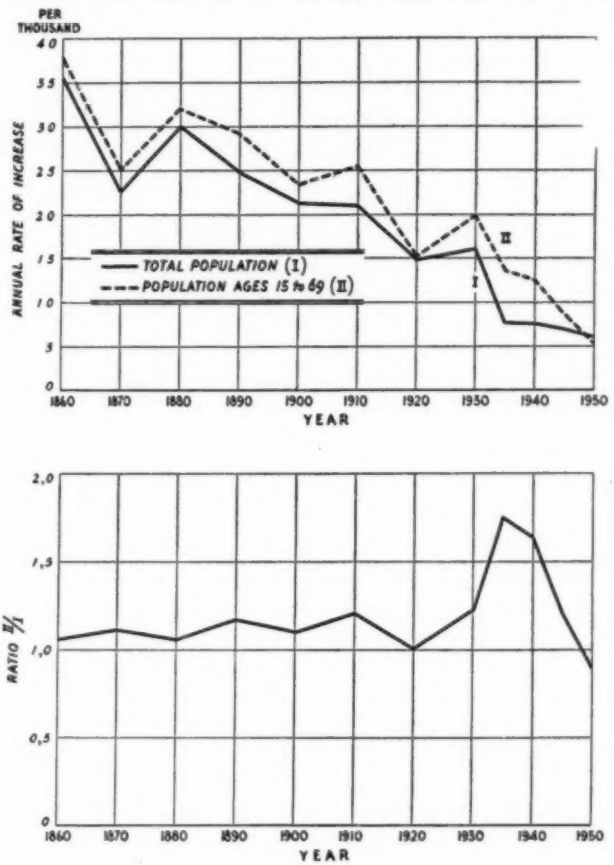


Table IV there have been set forth the per cent rates of increase for the total population of the United States, over the calendar period 1850 to 1930, extended to 1950 by estimates; and side by side with these figures the rates of increase of the population between the ages 15 and 69 have been shown. The last column gives the ratio of the increase in the population of ages 15 to 69 to the corresponding increase in the total population at successive decennial dates and in the last

three quinquennia. This table brings out a point which may be of very serious interest. Over the early decennia from 1850 to 1930, the ratio of the two rates of increase has not varied very greatly, the lowest value being 1.01 and the highest 1.23. But it will be noticed that from 1930 to 1935 there was a sudden increase in this ratio from 1.23 to 1.75. Here the rate of increase of the population between the ages 15 and 69 is almost twice as great as that of the total population, and judging from the forecast for 1940, that situation will continue essentially until that time. By 1945, this great disparity will again disappear. These facts are brought out graphically in Figure 6.

It is interesting to ponder what effect this situation may have on the opportunity for young persons to obtain gainful employment.

PHENOMENA EXHIBITED BY PARTICULAR UNITS OF THE POPULATION

Population analysis is concerned not only with the gross phenomena presented by the population regarded as a whole, but comprises within its scope also the consideration of specific phenomena exhibited by unit elements of which the population is composed. Without going to the extreme in this process of particularization, we shall here devote a few paragraphs to a certain aspect of family statistics.

If in a semi-logarithmic system of coordinates we represent the probability p_n or π_ν that a new-born child shall, in the course of its life, ultimately have n children or ν sons, a series of points is obtained, which, at any rate up to $n=10$, array themselves essentially in a straight line. In the graph Figure 7 thus constructed on the basis of the statistics of the United States (white persons) a curious circumstance becomes apparent; the probability of having two sons is equal to that of having two children. How does this singular result come about?

The probability of having n children, according to the linear distribution exhibited in Figure 7 is

$$p_n = 0.7358^{(n-1)}p_1 \tag{1}$$

or, say

$$p_n = \gamma^{(n-1)}p_1 \,. \tag{2}$$

Let α be the proportion of male births and $\beta=(1-\alpha)$ be the proportion of female births in the total. Then, by an application of elementary principles of the calculus of probability, we find for the probability π of having ν sons, the expression

$$\pi_r = \Gamma^{r-1}\pi_1 \tag{3}$$

$$\Gamma = \frac{\alpha\gamma}{1 - \beta\gamma} \tag{4}$$

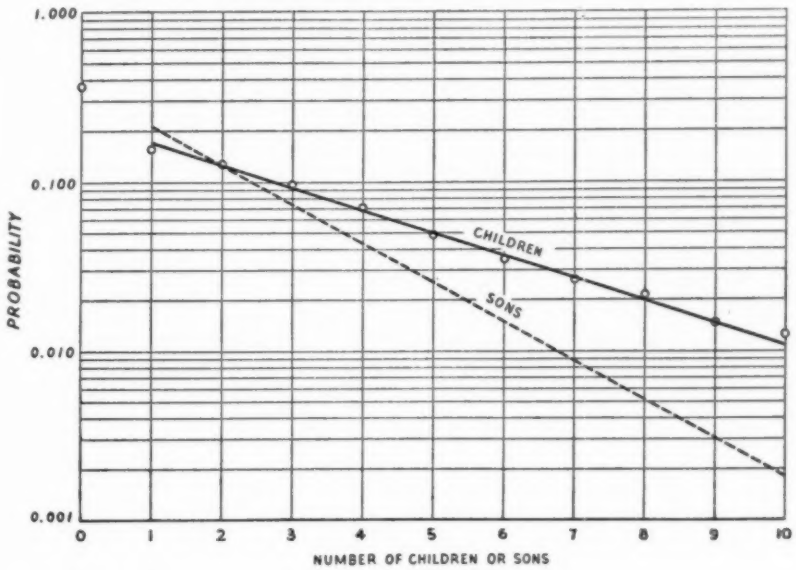
$$= \frac{0.515}{1 - 0.485 \times 0.736} \tag{5}$$

$$= 0.589 \tag{6}$$

$$\pi_1 = \alpha p_1 + 2\alpha\beta\gamma p_1 + 3\alpha\beta^2\gamma^2 p_1 + \cdots = \frac{\alpha p_1}{(1 - \beta\gamma)^2} . \tag{7}$$

FIGURE 7

PROBABILITY FOR A NEW-BORN MALE OF EVENTUALLY HAVING A SPECIFIED NUMBER OF CHILDREN OR A SPECIFIED NUMBER OF SONS



Let us find the ratio

$$\pi_2/p_2 = \alpha^2/(1 - \beta\gamma)^3 = 0.2652/0.2660 = 0.9971 . \tag{8}$$

In round numbers this ratio is therefore 1. This arises from the fact that α and β are nearly equal, that is to say, the probability of a male or a female birth is in either case approximately one-half; on the other hand γ has a value of about three-quarters, so that according to formula (8) it follows that

$$\pi_2/p_2 = \tfrac{1}{4}/(1 - \tfrac{1}{2} \times \tfrac{3}{4})^3 = 1.024 . \tag{9}$$

We have here a statistical curiosity discovered accidentally by the

author in dealing with the problem of the probability of extinction of a family.[9]

THE IDEAL AIM OF RATIONAL POPULATION ANALYSIS

The particularization of the discussion could be carried further. From the consideration of the family as a social unit we could proceed to that of the individual himself. The ideal would be a model which, by its operation, would represent the actions and destinies of the individuals of a typical population. Such a model might consist of a collection of urns which, by a series of drafts conducted according to prescribed rules, would give us a truly representative sample of the characteristics of the population. This ideal, though incapable of realization in all detail, can be approached to within a degree of accuracy which will depend on the one hand on our sources of statistical data and on the other on the pains which we are willing to take in carrying out the task.

Such a model has been actually constructed on the basis of vital statistics of the United States, using, however, in place of inconvenient urns, an equivalent device, a kind of roulette wheel, with discs divided by radial lines into sectors of suitably adjusted angle. Unfortunately it is not possible on a scale suitable for these pages to reproduce the series of discs employed in this model.

[9] A. J. Lotka, "The Extinction of Families," *Journal of the Washington Academy of Sciences*, Vol. 21 (1931), pp. 377, 453.

PROCEEDINGS

NINETY-NINTH ANNUAL MEETING

HADDON HALL, ATLANTIC CITY

PROGRAM

Monday, December 27, 1937

—2:30 P.M.—

THE THEORY AND APPLICATIONS OF THE CHI-SQUARE TEST

Chairman: Burton H. Camp, Wesleyan University

Theory of the Chi-Square Test

Thornton C. Fry, Bell Telephone Laboratories

Some Thoughts on Curve Fitting and Extrapolation

W. Edwards Deming, U. S. Department of Agriculture

Difficulties of Interpretation Encountered in the Application of the Chi-Square Test

Joseph Berkson, Mayo Clinic

CHANGING TRENDS IN FINANCING OF AMERICAN BUSINESS

Chairman: Leonard P. Ayres, The Cleveland Trust Company

The Function of Deposit Banking

E. A. Goldenweiser, Board of Governors of the Federal Reserve System

Tendencies in Consumer Financing

Rolf Nugent, Russell Sage Foundation

Changes in Capital Financing

Donald B. Woodward, Moody's Investors Service

FAMILY INCOMES

(With the Conference on National Income and Wealth)

Chairman: Simon Kuznets, National Bureau of Economic Research

Changes in the Distribution of Family Incomes Between 1929 and 1933

David L. Wickens, National Bureau of Economic Research

Distribution by Income and Sources of Incomes of Families of Different Sizes and Composition

Bernard Barton, Bureau of Labor Statistics

—7:00 P.M.—

DINNER MEETING FOR FELLOWS AND REGULAR MEMBERS OF THE AMERICAN STATISTICAL ASSOCIATION TO CONSIDER THE OBJECTIVES AND PROGRAM OF THE ASSOCIATION

Chairman: W. Randolph Burgess, President

Report of the Board of Directors

Announcement of the Election of Fellows

Discussion of the Plans and Progress of the Association

Tuesday, December 28, 1937

—10:00 A.M.—

THE THEORY AND APPLICATIONS OF FIDUCIAL PROBABILITY

Chairman: Walter A. Shewhart, Bell Telephone Laboratories

Introduction to Fiducial Probability
Edward V. Huntington, Harvard University

Fiducial Distributions
S. S. Wilks, Princeton University

Discussion: George W. Snedecor, Iowa State College

PUBLIC OPINION AND PUBLIC RELATIONS

Chairman: Donald R. Belcher, American Telephone and Telegraph Company

Quantitative Methods in Politics
Stuart A. Rice, Central Statistical Board

Government and the Sampling Referendum
George Gallup, American Institute of Public Opinion

Public Opinion and Public Relations
Edward L. Bernays, Counsel on Public Relations

FUNCTION OF DEPOSIT BANKING

Chairman: John H. Williams, Federal Reserve Bank of New York

Trends of Principal Earning Assets and Their Significance
William J. Carson, University of Pennsylvania

Distribution of Bank Deposits
Lauchlin Currie, Board of Governors of the Federal Reserve System

Trends of Bank Earnings and Expenses
Donald S. Thompson, Federal Deposit Insurance Corporation

Uses of Statistics in Bank Administration and Supervision
Homer Jones, Federal Deposit Insurance Corporation

TENDENCIES IN CONSUMER FINANCING

Chairman: Wilbur C. Plummer, University of Pennsylvania

Consumer Financing and Its Relations to the Commercial Bank
David C. Barry, Lincoln-Alliance Bank and Trust Company

The Economic Function of the Sales Finance Company
Milan V. Ayres, National Association of Sales Finance Companies

Public Supervision of Consumer Credit
William T. Foster, Pollak Foundation for Economic Research

—12:00 NOON—

COMMITTEE ON SOCIOMETRICS

(Luncheon Meeting with Section on Sociology and Psychiatry, American Sociological Society)

Chairman: George A. Lundberg, Bennington College

Speaker: J. L. Moreno, Beacon Hill Hospital

Tuesday, December 28, 1937

—12:30 P.M.—

LUNCHEON MEETING, COMMITTEE ON CENSUS ENUMERATION AREAS
Chairman: Howard Whipple Green, Cleveland Health Council
Extension of Census Tracts to Suburban Areas of Metropolitan Cities
Clarence E. Batschelet, Bureau of the Census

—2:30 P.M.—

MARKET PRICE AND COST ANALYSIS
(With the American Marketing Association)
Chairman: Vergil D. Reed, Bureau of the Census
Varying Functions in Distribution: Their Costs and Influence on Prices
John F. Thomas, Sears, Roebuck and Company
The Effects of Cost Analysis on Prices
W. H. S. Stevens, Interstate Commerce Commission
Differential Selling Costs in Relation to Wholesale Prices
Donald R. G. Cowan, Swift and Company

BIOMETRICS
Chairman: E. B. Wilson, Harvard University
Some Problems Arising in Analysis of Compound Frequency Distributions
Robert A. Nesbit, Harvard Biological Laboratories
Discrete Frequency Distributions Arising from Mixtures of Several Single Probability Values
H. Muench, The Rockefeller Foundation
Biological Applications of Normal Range and Significance Estimates in Ignorance of Original Distribution Forms
William R. Thompson, New York State Department of Health
Sampling a Marine Fish Population: Some Problems and Results
William C. Herrington, Harvard Biological Laboratories
A Secondary Sampling Problem in Human Biology
E. Morton Jellinek, Worcester State Hospital

EMPLOYMENT AND UNEMPLOYMENT STATISTICS
Chairman: Faith M. Williams, Bureau of Labor Statistics
Some Measures of Changing Labor Productivity and their Uses of Economic Analysis
David Weintraub, National Research Project
Measuring Unemployment as Status or Behavior
Calvert L. Dedrick, National Unemployment Census
The Federal-State Cooperative Program for Employment and Payroll Statistics
Sidney Wilcox, Bureau of Labor Statistics

CHANGES IN CAPITAL FINANCING
Chairman: Ralph A. Young, University of Pennsylvania
Changes in the Secondary Distribution of Equities
Harry J. Loman, University of Pennsylvania
Changed Conditions in the Marketing of New Issues
Jules I. Bogen, Journal of Commerce
Changes in Real Estate Financing
David L. Wickens, National Bureau of Economic Research

Tuesday, December 28, 1937

—3:00 P.M.—

SOME STATISTICAL METHODS

(With the American Sociological Society)

Chairman: Thomas C. McCormick, University of Wisconsin

A Study of the Relationships between Juvenile Delinquency and Other Indices of Social Disorganization

Jerry A. Neprash, Franklin and Marshall College

Adequacy of State Care of Mental Patients

Ellen Winston, Works Progress Administration

The Analysis and Treatment of Partial Information Schedules and Refusals in Social Surveys

Mildred Parten, Bureau of Labor Statistics

Fitness for Parenthood

J. Yerushalmy, New York State Department of Health

Discussion: Leonard S. Cottrell, Jr., Cornell University
Robert E. L. Faris, Brown University
A. R. Mangus, Works Progress Administration

—8:00 P.M.—

PRESIDENTIAL ADDRESSES

(With the American Economic Association)

Chairman: Davis R. Dewey, Massachusetts Institute of Technology

Oliver M. W. Sprague, American Economic Association

W. Randolph Burgess, American Statistical Association

Wednesday, December 29, 1937

—9:30 A.M.—

MEASUREMENT OF MARKETS AND OF ADEQUACY OF MARKETING METHODS

(With the American Marketing Association)

Chairman: Lyndon O. Brown, Northwestern University

Getting Significant Facts from Market Data

Theodore H. Brown, Harvard University

Determining the Significance of Sampling Necessary in Studies of Retail Trade

J. Parker Bursk, University of Pennsylvania

Analyzing the Radio Market

John J. Karol, Columbia Broadcasting System

The Problem of Measuring Radio Coverage

L. D. H. Weld, McCann-Erickson, Incorporated

Wednesday, December 29, 1937

—10:00 A.M.—

STATISTICS RELATED TO SOCIAL SECURITY

Chairman: Samuel A. Stouffer, University of Chicago

Some Possibilities of Utilizing Social Security Data for Sociological Research Projects

Dorothy S. Thomas, Institute of Human Relations, Yale University

Economic Data Available from Social Security Sources

Eleanor L. Dulles, Social Security Board

Discussion: Ewan Clague, Social Security Board

THE INFLUENCE OF VARIOUS FACTORS UPON FLUCTUATIONS OF INVESTMENT

(With the American Economic Association)

Chairman: Sumner H. Slichter, Harvard University

The Rate of Interest

Richard M. Bissell, Jr., Yale University

Security Markets and the Investment Process

Kemper Simpson, Formerly with the Securities and Exchange Commission

Corporate Price Policies

Corwin D. Edwards, Federal Trade Commission

BIOMETRICS

Chairman: Lowell J. Reed, The Johns Hopkins University

Actuarial Studies of Dental Caries

Carroll Palmer and Henry Klein, U. S. Public Health Service

Comparability of Mortality Statistics

Theodore A. Janssen and Halbert L. Dunn, Bureau of the Census

Defects in Present Information on Differential Reproduction

Frank Lorimer, Population Association of America

—12:30 P.M.—

LUNCHEON MEETING. STATISTICS IN RELIEF ADMINISTRATION

(Arranged by the Joint Committee on Relief Statistics, American Public Welfare Association and American Statistical Association)

Chairman: Paul Webbink, Committee on Social Security, Social Science Research Council

Consolidated Statistics of Relief Expenditures Since 1933

Dorothy Fahs Beck, Central Statistical Board

Incidence of Emergency Dependency in New York State During the Depression

Edward T. Frankel, New York State Department of Social Welfare

Discussion: Herman M. Somers, Wisconsin State Department of Welfare

Wednesday, December 29, 1937

—2:30 P.M.—

ROUND TABLE SESSIONS ON FLUCTUATIONS IN INVESTMENT
(With the American Economic Association)

1. GENERAL INTEREST THEORY
   Chairman: Bernard F. Haley, Stanford University
   Discussion: Paul T. Ellsworth, University of Cincinnati
   Arthur W. Marget, University of Minnesota
   Max F. Millikan, Yale University
   Walter A. Morton, University of Wisconsin

2. RATE OF INTEREST
   Chairman: Winfield W. Riefler, Institute for Advanced Study
   Discussion: John B. Canning, Stanford University
   J. Franklin Ebersole, Harvard University
   Harry White, Department of the Treasury
   Fred R. Macaulay, National Bureau of Economic Research

3. SECURITY REGULATION
   Chairman: Ray B. Westerfield, Yale University
   Discussion: Karl R. Bopp, University of Missouri
   Fritz Machlup, University of Buffalo
   Raimund W. Goldschmidt, Securities and Exchange Commission
   Carl E. Parry, Board of Governors of the Federal Reserve System
   Alexander Sachs, Lehman Brothers
   John E. McDonough, Securities and Exchange Commission
   Fritz Lehmann, New School for Social Research
   James C. Dolly, University of Texas

4. CORPORATE PRICE POLICIES
   Chairman: Frederick B. Garver, University of Minnesota
   Discussion: Gustav Seidler, National Resources Committee
   Lloyd G. Reynolds, Harvard University
   Frank M. Boddy, University of Minnesota
   Rufus S. Tucker, General Motors Corporation

5. CAPITAL GAINS AND LOSSES, THEIR TREATMENT IN INCOME MEASUREMENT AND IN INCOME TAXATION
   Chairman: George O. May, Price, Waterhouse & Co.
   Discussion: Roy Blough, University of Cincinnati
   William Hewett, University of Cincinnati
   Robert M. Haig, Columbia University
   Harold M. Groves, University of Wisconsin
   Henry C. Simons, University of Chicago

Wednesday, December 29, 1937

—2:30 P.M.—

REPRESENTATIVENESS AND BIASES OF SURVEY DATA AND INDEX NUMBERS
Chairman: J. Frederic Dewhurst, The Twentieth Century Fund
Bias in Studies of Family Income and Methods of Compensating for It
A. D. H. Kaplan, Bureau of Labor Statistics
Representativeness of Market Surveys
Paul T. Cherington, Market Research Corporation of America
Statistical Bias in Primary Data and Public Policy
A. F. Hinrichs, Bureau of Labor Statistics

SOCIAL SECURITY
(With the American Association for Labor Legislation)
Chairman: Edwin E. Witte, University of Wisconsin
European and American Social Security Parallels
C. A. Kulp, University of Pennsylvania
Financing of Social Security Costs, Particularly by the States
Wilbur Cohen, Social Security Board
Medical Costs in California
Paul A. Dodd, University of California
Discussion: J. Douglas Brown, Princeton University
Clarence Heer, University of North Carolina
Michael M. Davis, Committee on Research in Medical Economics

BIOMETRICS
Chairman: Joseph Berkson, Mayo Clinic
Relation of Birth Order to Insanity
Benjamin Malzberg, New York State Department of Mental Hygiene
Residual Relationships and Velocity of Change as Pitfalls in the Field of Statistical Forecasting
Leon E. Truesdell, Bureau of the Census
A Short Method of Life Table Construction
Margaret Merrell, The Johns Hopkins University
The Methodological Considerations in Comparison of Rates for Geographic Areas
Samuel A. Stouffer, University of Chicago

—5:00 P.M.—

SECOND SESSION OF THE ANNUAL BUSINESS MEETING
Election of Officers

—6:30 P.M.—

BUSINESS PROSPECTS
Chairman: W. Randolph Burgess, President, American Statistical Association
Speakers: Lionel D. Edie, Capital Research Company
Leonard P. Ayres, The Cleveland Trust Company

Thursday, December 30, 1937

—10:00 A.M.—

THE INFLUENCE OF VARIOUS FACTORS UPON FLUCTUATIONS OF INVESTMENT
(With the American Economic Association)
Chairman: Joseph S. Davis, Stanford University
Fiscal Policies
Arthur D. Gayer, Columbia University
Rate of Consumption
Albert G. Hart, University of Chicago
Wage Rates
Leo Wolman, Columbia University

RESEARCH PAPERS IN MATHEMATICAL STATISTICS
Chairman: Robert W. Burgess, Western Electric Company
On Certain Limiting Distributions and Asymptotic Expansions in Statistical Theory
William G. Madow, Milbank Management Corporation
The Limiting Distribution of Canonical Correlations and Related Topics
Meyer A. Girshick, Columbia University

—10:30 A.M.—

MONETARY POLICIES AND AGRICULTURE
(With the American Farm Economic Association)
Chairman: M. S. Szymczak, Board of Governors of the Federal Reserve System
Present Federal Reserve Policies
Melchior Palyi, University of Chicago
Inflation and the Farmer
Louis H. Bean, Agricultural Adjustment Administration
Discussion: Arthur R. Upgren, University of Minnesota
Fred L. Garlock, Bureau of Agricultural Economics

—1:00 P.M.—

HOW TO STUDY THE SOCIAL ASPECTS OF THE DEPRESSION
(With the American Sociological Society)
Chairman: Wesley C. Mitchell, Columbia University
Discussion led by Edwin B. Wilson, Harvard University

—2:30 P.M.—

INTERPRETATION OF STATISTICAL DATA ON FAMILY EXPENDITURES
Chairman: Clark Warburton, Federal Deposit Insurance Corporation
The Regression Analysis of Family Expenditure Data
Milton Friedman, National Bureau of Economic Research
Variations in Family Living Expenditures
Dorothy Brady, Bureau of Home Economics
Expenditure Patterns of Urban Families of Different Income Levels
Mildred Parten and A. C. Rosander, Bureau of Labor Statistics

Thursday, December 30, 1937

—2:30 P.M.—

ROUND TABLE SESSIONS ON FLUCTUATIONS IN INVESTMENT
(With the American Economic Association)

1. FISCAL POLICIES
   Chairman: Robert M. Haig, Columbia University
   Discussion: Alfred G. Buehler, University of Vermont
   Arthur R. Upgren, University of Minnesota
   Carl Shoup, Columbia University
   Melchior Palyi, University of Chicago

2. SOCIAL SECURITY PROGRAM
   (With the American Association for Labor Legislation)
   Chairman: William A. Berridge, Metropolitan Life Insurance Company
   Discussion: Harold V. Roelse, Federal Reserve Bank of New York
   Otto Nathan, New York University
   Eleanor L. Dulles, Social Security Board
   Edison L. Bowers, Ohio State University

3. RATE OF CONSUMPTION
   Chairman: Simon Kuznets, National Bureau of Economic Research
   Discussion: Herbert D. Simpson, Northwestern University
   George Halm, Tufts College
   Walter Egle, Ohio State University
   H. L. McCracken, Louisiana State University

4. DURABLE CONSUMERS' GOODS
   (With the American Marketing Association)
   Chairman: Calvin Hoover, Duke University
   Discussion: Albert Haring, Lehigh University
   Norman J. Silberling, Stanford University
   G. Coleman Woodbury, National Association of Housing Officials
   F. Leslie Hayford, General Motors Corporation

5. WAGE POLICIES
   (With the American Association for Labor Legislation)
   Chairman: Frank D. Graham, Princeton University
   Discussion: Paul Sweezy, Harvard University
   Carroll R. Daughtery, University of Pittsburgh
   Lorie Tarshis, Tufts College

6. PRICE CHANGES AND NATIONAL INCOME
   Chairman: Morris A. Copeland, Central Statistical Board
   Discussion: Gottfried Haberler, Harvard University
   Hans Neisser, University of Pennsylvania
   Lauchlin Currie, Board of Governors of the Federal Reserve System
   Charles O. Hardy, Brookings Institution

Minutes of the Annual Business Meeting

The American Statistical Association convened for the ninety-ninth annual business meeting at 8:20 P.M., Monday, December 27, 1937, at Haddon Hall in Atlantic City. President W. Randolph Burgess presided.

The minutes of the ninety-eighth annual business meeting were approved as published in the JOURNAL.

The amendments to the Constitution which had been approved at the ninety-eighth annual business meeting were adopted.

It was voted to amend By-Law 4 to make it read as follows:

> 4. There shall be eight Vice-Presidents. The field or fields of interest to be represented by each Vice-President shall be specified by the Board of Directors. The Nominating Committee shall make a nomination for each field of interest except that with the approval of the Board of Directors the Committee may nominate a smaller number of Vice-Presidents by assigning to some of them responsibility for representing more than one field of interest.

E. A. Goldenweiser read the report of the Committee on Fellows and announced that the following members had been elected as Fellows: Robert W. Burgess, Harold Hotelling, Aryness Joy, Simon Kuznets, O. C. Stine and Leon E. Truesdell.

The report of the Nominating Committee was read by E. B. Wilson.

The Secretary read the Annual Report of the Board of Directors.

Stuart A. Rice spoke briefly on the development of plans for celebrating the centenary of the Association in the fall of 1939.

Walter F. Willcox spoke on the meeting of the International Statistical Institute in the United States in 1939.

The agenda of the annual business meeting was arranged to leave considerable time for a general discussion of the Association's plans and progress. Quite a number of officers and members participated. One member expressed his belief that the JOURNAL should be devoted less to methodology and more to the practical problems with which statisticians are struggling. He thought the *Bulletin* would be very valuable if it reported statistical projects under way in state bureaus and other organizations. Another member communicated his desire to have greater emphasis in the Association's meetings and publications on practical problems and on the meaning of statistical interpretations rather than on the figures by themselves. It was suggested that the Association seek to develop an adequate scheme of classification of statistical materials for special libraries. A project was proposed to determine what a statistician is, how many statisticians there are, and what opportunities there may be for college students who wish to enter statistical occupations.

The Association was urged to give attention to glaring instances of error and misinterpretation in the use of statistics which may be found even in publications of organizations of the highest reputation. Review and critical examination of statistical work was suggested by several members as a very important function that the Association should perform. A plan of committee

procedure which might prove most effective in performing this function was proposed.

Officers and members were reminded that special efforts were needed to maintain the budget and program of the Association at their present level as the Rockefeller Foundation grant diminishes each year toward its termination in 1940. It was noted that the diversified membership of the Association was both a weakness and strength; that in bringing together statisticians from the universities, from business, and from government, the Association has a great opportunity to overcome the departmentalizing of scientific knowledge and research. A more extensive summary of the discussion is to be published in the *Bulletin*.

The meeting was adjourned to 5:00 P.M., December 29, 1937.

The annual business meeting was resumed at 5:00 P.M., Wednesday, December 29, 1937. The Secretary reported that he had received no nominations by petition. It was voted to instruct the Secretary to cast one ballot for the nominees presented by the Committee on Nominations. The ballot was cast and the following officers and directors were elected:

President R. H. COATS

Vice-Presidents

Collection and Classification of Data, and Administration of Statistical Agencies
ISADOR LUBIN

Statistical and Actuarial Methods and Technique, and the Teaching of Statistics
BURTON H. CAMP

Facts and Methods Pertaining to Sociology, Social Welfare Problems, and Labor Statistics
SAMUEL A. STOUFFER

Facts and Methods Related to Biometry, Vital Statistics, Psychology, and Education
HALBERT L. DUNN

Facts and Methods Bearing upon Economics and Economic Theory
RALPH C. EPSTEIN

Facts and Methods Pertaining Primarily to Business
THEODORE H. BROWN

Facts and Methods Pertaining to Financial Institutions
CHARLES O. HARDY

Facts and Methods Pertaining to Marketing
DAVID R. CRAIG

Directors (For terms expiring at the close of the Annual Meeting in 1940)
W. RANDOLPH BURGESS
GEORGE O. MAY

Secretary-Treasurer FREDERICK F. STEPHAN

The following resolutions were adopted:

RESOLVED, that the members of the American Statistical Association express to W. Randolph Burgess their great appreciation of his leadership as President during 1937 and extend congratulations and thanks to him and to Vice-Presidents Faith M. Williams, Burton H. Camp, Samuel A. Stouffer, Halbert L. Dunn, Alvin H. Hansen, Donald R. Belcher, Casimir A. Sienkiewicz, and John H. Cover for arranging the very fine program of this Annual Meeting.

RESOLVED, that the American Statistical Association expresses its gratitude and appreciation to J. Frank Rehfuss, representative on the Joint Committee on Local Arrangements and to Howard T. Hovde, Chairman of that Committee, for their painstaking work in making the local arrangements essential to the success of this Annual Meeting.

RESOLVED, that the American Statistical Association warmly thanks the management and employees of the Chalfonte-Haddon Hall for the fine hospitality which the members of the Association have enjoyed.

RESOLVED, that the American Statistical Association warmly thanks the management and employees of the Traymore Hotel for the fine hospitality extended to the Association for two of the principal sessions of this Annual Meeting.

The meeting was adjourned.

FREDERICK F. STEPHAN, *Secretary*

Report of the Board of Directors

Nineteen hundred and thirty-seven has been a year of accomplishment and continued growth. Although many of our objectives are yet to be reached, we have made substantial progress and can look back on the year with a sense of satisfaction. With the continued cooperation of the officers, Fellows, and regular members of the Association during the year which is about to begin, we may hope to report further advances when we meet again a year hence.

We may pause to review at this time the meetings that we have held during the year, the activities of our chapters and committees, our publications, the growth of our membership, our financial situation, and our program of objectives.

Meetings: During the course of the year the President and Vice-Presidents, with the advice and assistance of the Secretary and many members of the Association, have prepared an extensive program for this, the Ninety-ninth Annual Meeting. To a greater extent than in previous years, we are sharing the sponsorship of some of the sessions with our kindred associations. Twenty-three of the 41 sessions are joint sessions. A principal part of the program is the series of sessions arranged by the American Economic Association

and the American Statistical Association beginning with the presidential addresses and continuing with two general sessions and eleven round tables. The central theme of this series is "The Influence of Various Factors Upon Fluctuations in Investment." For other fields of interest, sessions have been arranged by each of the Vice-Presidents and by three of the Association's committees. It has not been possible to include in the program all of the subjects which have been suggested or to avoid entirely the scheduling of sessions at the same time as other sessions devoted to closely related subjects, but a wide range of significant statistical subjects will be presented by the speakers and there will be many opportunities for fruitful discussion.

A special meeting of the Association was held in Denver last June in connection with the summer meetings of the American Association for the Advancement of Science. The Econometric Society and the American Sociological Society joined with us in sponsoring some of the sessions.

The Committee on Biometrics joined with the Committee on Vital Statistics of the American Public Health Association in sponsoring a meeting in October in New York City. The Committee on Labor Statistics conducted a Conference on Occupational Classification in Philadelphia in April. The Association's committees in the field of social welfare met together in Indianapolis during the National Conference of Social Work in May. In September a small group of business statisticians met for a full day's meeting on invitation from our Vice-President for business statistics. These meetings and the regular meetings of the Association's committees have provided opportunities for the discussion of statistical problems and for conference between members interested in special subjects.

Chapters: The chapters of the Association have had a rich program of meetings during the year, reports of which are published in the JOURNAL. During the year the charter of the Los Angeles Chapter, which had become inactive, was revoked and new chapters in Cincinnati and the Lehigh Valley were chartered. As a result of a conference with representatives from the chapters held at the last annual meeting, the Directors have revised the regulations pertaining to chapters with the hope that the new regulations may be beneficial both to the chapters and to the Association.

Committees: The Association has a number of committees concerned with specific fields of statistical data and analysis. Reports of their work are published each year in the March issue of the JOURNAL. The Committee on Committee Organization and Activities (formerly the Committee to Stimulate and Coordinate Research) consists principally of the chairmen of these committees and is appointed to review the fields in which the Association has or might have committees at work, to advise the Board of Directors with respect to the appointment of committees, and to facilitate cooperation between committees working on related problems. This Committee has met twice during the year and has functioned as a conference on the Association's committee work.

At the beginning of the year, after discussion and with mutual agreement, the American Economic Association withdrew from participation in the

appointment of the Advisory Committee on the Census in order to simplify the organization of the Committee and facilitate the appointment of a membership more widely representative of the fields in which the Census Bureau operates. In performing its function of advising the Director of the Census, the Committee met in Washington in April and again in October.

The Committee on Census Enumeration Areas met in July to discuss certain census tract problems presented by the Central Statistical Board and the Works Progress Administration. Through correspondence and a conference of representatives of census tract cities at the time of the Association's annual meetings each year, the Committee is extending the use of census tract data and developing definite recommendations with respect to the data which should be tabulated.

The Committee on Statistics of Delinquents and Criminals has continued its contact with the collection of criminal judicial statistics by the Census Bureau and with the needs expressed by several states for a handbook of procedure for the compilation of these statistics.

The Joint Committee on Income Tax Statistics did not meet during the year, but its Chairman conferred with representatives of the Treasury Department concerning changes in the tabulation of corporation income data. Further conferences involving the full Committee are planned for the coming year.

The principal activity of the Committee on Labor Statistics this year was the organization of the Conference on Occupational Classification mentioned previously. An informal meeting with the Advisory Committee on the Census has been planned for an early date in January.

The Committee on Statistics of Institutions for Mental and Physical Disorders met twice during the year, maintaining contact with committees of other organizations which are working toward the same statistical objectives. The Committee is giving considerable attention to the development of a simplified manual for the collection of hospital statistics and has proposed a registration area for social welfare statistics.

The Joint Committee on Relief Statistics has met six times during the year and has planned a seventh meeting during this annual meeting period. It has served as an advisory committee to the Division of Public Assistance Statistics of the Social Security Board and has also advised several other agencies informally in response to special requests. The Committee held conferences of relief statisticians at the time of the meetings of the National Conference of Social Work and the American Public Welfare Association. Its Bulletin of Information for Relief Statisticians has been issued three times this year.

The Committee on Statistics of Dependent Children in Foster Care, having completed a major project, is exploring its further opportunities for useful work in this field.

The Committee on an Annual Review of Progress in Mathematical Statistics met early in the year and outlined a plan for reviews of individual topics, one or two of which would be presented each year. These reviews

are planned to cover the development of the topic during a period of years and to include a discussion of the underlying theory and the practical applications of each method. Some of the topics are to be discussed at meetings, then prepared for publication. In accordance with this plan, sessions on the chi-square test and on fiducial probability have been arranged as part of the program for this Annual Meeting.

The Committee on Biometrics joined with the Vital Statistics Section of the American Public Health Association in holding a meeting in October in New York City. In cooperation with the Vice-President responsible for this field, the Secretary of the Committee arranged three sessions of scientific papers for this Annual Meeting.

The Committee on Sociometrics has planned a luncheon meeting with the Section on Sociology and Psychiatry of the American Sociological Society at this Annual Meeting.

Through its representatives, the Association participated in the work of the Social Science Research Council, the National Bureau of Economic Research, the American Association for the Advancement of Science, the Business Research Council, the National Conference on the Nomenclature of Disease, the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing, the Sectional Committee on Standards for Graphic Presentation, the Conference on National Income and Wealth, and the New York Management Council.

The Association does not have funds with which its committees can undertake extensive investigations or research work. In a few instances in the past, Association committees have received special grants from other sources to enable them to undertake major projects. Except in these instances, the principal function of the committees is to provide an opportunity for conferences between members of the Association who are actively interested in the problems of a definite field of statistical data. In the meetings of the Association's committees, members find an opportunity to confer with each other as individual statisticians rather than as official representatives of government agencies and private organizations. Consequently, they can concentrate their attention on the scientific aspects of their problems. One of the principal results of such conferences is the improvement of the procedures by which statistical data are collected and thereby the improvement of the data themselves.

Publications: The JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION completed its fiftieth year with the publication of the December issue. This year's volume has been similar in size and contents to the volumes immediately preceding it. The subjects treated in the articles have been principally those for which outstanding manuscripts were submitted, but, in selecting manuscripts for publication, an effort was made to achieve a better balance of material in relation to the interest of the members of the Association. In some subjects there was a dearth of suitable manuscripts but in most subjects there were many more manuscripts than could be published in the JOURNAL. The Editor was assisted in the selection of papers by a number of

editorial advisers whose recommendations were a highly important part of the editorial work.

Approximately one-fifth of this year's volume was devoted to reviews of books on statistical subjects. Many members report that they find this part of the JOURNAL of greatest interest. The book-review section of the JOURNAL is entirely under the direction of the Review Editor. The JOURNAL continues to carry news and notes concerning the activities of various statistical agencies and reports of the meetings of the Association's chapters.

Three issues of the Association's bulletin were sent to members during the year, carrying announcements of meetings, news about members, letters from members on several statistical problems, and the preliminary program of the annual meeting. There have been many expressions of interest in the bulletin and it appears to have demonstrated its value. In the future it may be published more frequently as some members have suggested. There is reason to believe that it will become increasingly valuable as the officers, committees, and members of the Association find opportunities to use it in presenting informal communications to the membership of the Association.

Membership: The membership of the Association increased during 1937 from 1,875 to 2,044 members. Four members became Life Members during the year bringing the number of Life Members to 34, and three members became Contributing Members. The membership of the Association is still smaller than it was in 1930 when there were 2,267 members. In response to a letter from the President last January, a number of members nominated persons of their acquaintance who were interested in statistics and other members submitted nominations throughout the year. The increase in membership is largely due to the response of these members.

Central Office: Early in the year the Board of Directors reviewed their original decision to locate the office of the Association in Washington and decided to continue the present location until at least July 1, 1938. An attempt has been made throughout the year to maintain close contact between the Association's headquarters and its membership in other cities than Washington, through visits by the Secretary and correspondence.

Finances: During the year the Association received $6,000 from The Rockefeller Foundation in connection with the special grant made in 1935 to enable the Association to strengthen its headquarters organization, to maintain contact with government statistics, and to develop its committee work. With this very substantial and welcome assistance in the Association's work, we are closing the year with an excess of receipts over expenditures. The Rockefeller Foundation grant continues through 1940 in amounts which diminish at the rate of $1,500 each year. The Board of Directors seeks the assistance of the Fellows and regular members of the Association in increasing the Association's income from dues, advertising, and special gifts, so that we may maintain our present activities and continue to progress.

Board of Directors: The Directors of the Association have given their time and attention to many phases of the Association's activities. They met five times during the year to consider the numerous items of business which come before the governing body of an active association, to review our progress, and to plan for the future. As an aid to continuity in the Board's administration of the Association's affairs and a guide to the officers, the Directors have prepared during the last two years an extensive memorandum outlining the policies and principles by which the Association has been guided in the past. Almost every phase of the Association's activities has been reviewed by the Board of Directors and numerous improvements have resulted. The Directors have consulted the other officers on many matters and have sought to establish closer contacts with the Fellows and regular members of the Association.

Objectives: In their discussions during the year the Directors have recognized a number of objectives. The fundamental purpose of the Association is the advancement of statistics, both as a scientific technique and as a body of data systematically compiled. Our activities are designed to accomplish this basic purpose by providing to members many opportunities for the discussion of statistical subjects and for cooperation in the pursuit of their scientific aims. We also seek to accomplish our fundamental purpose of advancing statistical science by cooperating with other associations through joint committees, joint meetings, and otherwise, and by cooperating with government statistical agencies through formal and informal advisory relationships.

There are many aspects of our fundamental objective which would be included in any detailed outline of what it involves. It includes the development of better methods and better data by providing facilities for the publication of new developments and the discussion of problems, by providing opportunities for conferences and constructive criticism, and by the encouragement of research. It includes the dissemination of knowledge concerning statistical information and technique in a way that supplements and benefits formal instruction in statistics in our universities and colleges. Such an outline would include promoting wider recognition of the standards and characteristics of good statistical work. It would also include a clearer conception of the duties and functions of the professional statistician and the part that he should play in management and in research. Several other detailed purposes might be listed, including the interest that every scientific organization has in promoting wise and proper applications of the science in many fields of human activity.

In order that we may realize our fundamental purposes we must plan the next steps and outline our more immediate objectives. We seek to improve our activities wherever they may be improved. We seek an increasingly active participation of the Fellows and Regular Members of the Association in these activities as officers, as committee members, as speakers, as contributors to the JOURNAL and to the Association's bulletin, and as active

members of the Association assisting in various ways. The immediate objectives through which we can accomplish this can be summarized in a brief outline:

1. *Organizational improvements.* The establishing of Chapters has improved our organization and provided opportunities for members to meet. We are now providing for the organization of sections, for those fields of statistical interest in which sectional organization will be advantageous.

2. *The Association office.* By arranging to have the Secretary-Treasurer devote his full time to the work of the Association, including editing of the JOURNAL, and by the development of the Association office, it has been possible to provide greater assistance to the officers and committees of the Association in their work. This has facilitated most of the Association's activities.

3. *The development of the bulletin.* The bulletin which has been issued three times a year during the last two years is becoming a very useful means of communication to keep the membership of the Association in touch with many of our activities and to bring before the Association communications from members on important subjects.

4. *Conferences and committee work.* We seek continued progress in the work of our committees and the further development of conferences on special subjects.

5. *A stronger financial basis.* We need to increase our income in order that we may continue to maintain the activities now being financed in part through The Rockefeller Foundation grant and in order that we may make further improvements in these activities. The maintaining of the Association office, the development of the bulletin, the committee work, the travel expenses of officers in connection with Association business and in visiting chapters, and other important phases of our activities depend upon the realization of this objective. Our principal opportunities to increase our income lie in the expansion of our membership, increasing our subscription and advertising income, and securing contributing members. We may also hope that from time to time the Association will receive special gifts and contributions for its general program.

6. *An active, interested membership.* While an adequate financial basis is essential it is matched by the expenditure of time and effort without compensation on the part of many members of the Association. The activities of the Association cannot be carried on without this great voluntary contribution to what we are engaged in doing. The Association is deeply indebted to the officers and other members who have devoted so much of their time to its affairs and it goes forward into 1938 with the hope that these members will find in the Association's achievements values which justify the efforts which they have expended in its behalf.

W. RANDOLPH BURGESS	FREDERICK C. MILLS
MORRIS A. COPELAND	HENRY L. RIETZ
JOSEPH S. DAVIS	FRANK A. ROSS
WILLFORD I. KING	FREDERICK F. STEPHAN

Report of the Committee on Fellows

The Committee on Fellows has elected by unanimous vote the following Fellows: Robert W. Burgess, Harold Hotelling, Aryness Joy, Simon Kuznets, O. C. Stine, and Leon E. Truesdell.

WILLIAM F. OGBURN
EMANUEL A. GOLDENWEISER
E. DANA DURAND
WALTER A. SHEWHART
F. LESLIE HAYFORD

Report of the Secretary

Most of the activities with which the Secretary has been concerned are included in the Report of the Board of Directors. It is customary for the Secretary to report certain statistics about the membership of the Association. During 1937 the membership increased from 1,875 to 2,044, a net growth of 169 members. During the year 268 new members were elected, and 33 former members were reinstated. Eighty-three members were removed from the membership for failure to pay their dues, 17 of whom were reinstated before the end of the year. Fifty-seven members were lost by resignation and nine by death. At the end of the year 38 applications for membership beginning January 1, 1938, had been received.

Membership Statement, December 31, 1937

Honorary members	19
Corporate members	5
Fellows	91
Regular members	1,929
Total membership	2,044

Two Fellows and two Regular Members were Contributing Members during 1937. Four members became Life Members during the year, bringing the total number of Life Members to 34.

The death of the following members was recorded during the year: Warren M. Persons, Fellow, and Alden W. Baldwin, William Butterworth, Walter S. Case, Mary Johnston, Edward P. Kreevoy, Howard S. Mott, L. D. Peavey, and Horace L. Wheeler, Regular Members.

FREDERICK F. STEPHAN, *Secretary*

Report of the Treasurer

During 1937, net cash receipts, apart from receipts for the sale of securities, exceeded those of the preceding year by more than $1,000.00. This increase was principally due to an increase in dues, subscriptions, and JOURNAL sales more than sufficient to offset the decrease in The Rockefeller Foundation grant. Expenditures were increased in almost every category, reflecting increased activity and some new items of expense.

During the year, receipts from the sale of securities exceeded expenditures for the purchase of other securities by approximately $4,500.00 leaving a large cash balance to be reinvested in accordance with the orders of the Committee on Investments as specified in the By-Laws. A net profit of $1,280.29 was realized on the securities which were sold.

Investments are shown on the balance sheet at market value at the end of the fiscal year with cost figures for comparative purposes. The latter figures include the cost of certain shares of stock acquired during 1892 and 1893, the market value of which on December 31, 1937, was $1,970.00 less than cost. The market value of the other securities held at the end of the year was $2,347.73 less than cost. These changes in cash and investments are the principal changes reflected by the balance sheets during the last three years:

Assets	December 31, 1935	December 31, 1936	December 31, 1937
Cash	$ 2,367.65	$ 379.87	$ 4,994.64
Investments (market value)	8,099.00	13,874.25	5,391.75
Receivables	234.29	202.78	169.25
Inventories	1,535.00	1,535.00	1,535.00
Furniture and equipment, less depreciation	648.18	575.05	582.16
Total assets	$12,884.12	$16,566.95	$12,672.80
Liabilities and Surplus			
Unearned income	$ 2,433.24	$ 2,368.51	$ 2,670.91
Bills payable	0.00	76.55	0.00
Special accounts	0.00	63.70	128.44
Life memberships	1,980.00	2,030.00	2,276.10
Corporate surplus	8,470.88	12,028.19	7,597.35
Total liabilities and surplus	$12,884.12	$16,566.95	$12,672.80

A detailed balance sheet and statement of receipts and expenditures are attached.

FREDERICK F. STEPHAN, *Treasurer*

American Statistical Association
Balance Sheet, December 31, 1937

ASSETS

Current assets and investments:		
Cash		
Checking account (American Security and Trust Company)	$ 4,585.60	
Savings account (Emigrant Industrial Savings Bank)	374.04	
Awaiting deposit	35.00	$ 4,994.64
Investments*		5,391.75
Receivables		
Accrued interest	1.87	
Accounts receivable	67.38	
Dues receivable, less doubtful items	100.00	169.25
Inventories		
JOURNAL	$ 1,500.00	
Special publications	35.00	$ 1,535.00
Furniture and equipment, less depreciation		582.16
Total assets		$12,672.80

LIABILITIES AND SURPLUS

Current liabilities:		
Unearned income		
Dues	$ 1,013.75	
Subscriptions	1,637.00	
Miscellaneous credits	20.16	$ 2,670.91
Bills payable		0.00
Special accounts:		
The Rockefeller Foundation Grant		0.00
Allied Social Science Associations		128.44
Life memberships		2,276.10
Corporate surplus		7,597.35
Total liabilities and surplus		$12,672.80

* Market value, December 31, 1937. Cost $9,709.48.

American Statistical Association
Statement of Receipts, Expenditures, and Cash Balances

December 31, 1936, to December 31, 1937

Cash on hand, December 31, 1936:		
Checking account (American Security and Trust Company)	$ 13.21	
Savings account (Emigrant Industrial Savings Bank)	366.66	$ 379.87
Net cash receipts, December 31, 1936, to December 31, 1937:		
General account	$25,697.11	
Special accounts:		
The Rockefeller Foundation Grant	6,000.00	
Allied Social Science Associations	130.00	31,827.11
Total		$32,206.98
Net cash expenditures, December 31, 1936, to December 31, 1937:		
General account	$21,147.08	
Special accounts:		
The Rockefeller Foundation Grant	6,063.70	
Allied Social Science Associations	1.56	$27,212.34
Cash on hand, December 31, 1937:		
Checking account (American Security and Trust Company)	$ 4,585.60	
Savings account (Emigrant Industrial Savings Bank)	374.04	
Awaiting deposit	35.00	4,994.64
Total		$32,206.98

American Statistical Association
*Statement of Net Cash Receipts and Expenditures**
December 31, 1936 to December 31, 1937

	General Account	Special Account: The Rockefeller Foundation Grant	Total
Receipts:			
Dues	$10,857.57	—	$10,857.57
Subscriptions	3,603.00	—	3,603.00
Advertising	381.20	—	381.20
Reprints	165.00	—	165.00
JOURNAL sales	799.38	—	799.38
Special publications	65.97	—	65.97
Dividends and interest	872.58	—	872.58
Other receipts	160.89	—	160.89
The Rockefeller Foundation Grant	—	$ 6,000.00	6,000.00
Total receipts, exclusive of sale of securities	$16,905.59	$6,000.00	$22,905.59
Sale of securities†	8,791.52	—	8,791.52
Total receipts	$25,697.11	$6,000.00	$31,697.11
Expenditures:			
JOURNAL: printing, mailing and reprints	$ 5,231.25	—	$ 5,231.25
Bulletin	320.64	$ 240.50	561.14
Salaries and wages	7,829.94	3,898.36	11,728.30
Rent	456.26	623.74	1,080.00
Office supplies, printing and mimeographing	889.90	129.81	1,019.71
General postage and carriage	518.53	51.19	569.72
Telephone and telegraph	124.12	89.42	213.54
Travel expense: officers	547.96	570.54	1,118.50
Travel expense: committees	70.66	240.04	310.70
Mimeographing: committees	10.05	37.20	47.25
Furniture and equipment	109.85	—	109.85
Old JOURNALS purchased	127.05	—	127.05
Storage of old JOURNALS	82.47	—	82.47
Other expense	485.20	182.90	668.10
Total expenditures, exclusive of purchase of securities	$16,803.88	$6,063.70	$22,867.58
Purchase of securities	4,327.20	—	4,327.20
Total expenditures	$20,131.08	$6,063.70	$27,194.78

* Exclusive of special account for Allied Social Science Associations.
† Cost of securities sold, $7,511.23; net profit realized, $1,280.29.

Report of the Auditing Committee

We have examined the balance sheet of the American Statistical Association as of December 31, 1937, verified the cash, and checked the securities on hand. We have also examined the statement of receipts and expenditures.

In our opinion, the balance sheet is a correct statement of the financial condition of the Association and the receipts and expenditures statements are duly supported by accompanying vouchers.

D. C. ELLIOTT
ROBERT J. MYERS

List of Committees and Representatives for 1937

*Committee on Fellows**

William F. Ogburn
Emanuel A. Goldenweiser
E. Dana Durand
Walter A. Shewhart
F. Leslie Hayford

Committee on Nominations

Edwin B. Wilson, *Chairman*
Winfield W. Riefler
Willard L. Thorp

Auditing Committee

D. C. Elliott
Robert J. Myers

Committee on Investments†

Frederick R. Macaulay, *Chairman*
Willford I. King
Dean Langmuir

Program Committee for the Denver Meeting

W. Randolph Burgess
Carl Snyder
Frederick F. Stephan

Committee on Committee Organization and Activities‡

Meredith B. Givens, *Chairman*
Robert E. Chaddock
Morris A. Copeland
W. Leonard Crum
Neva R. Deardorff
Howard W. Green
The President and Secretary, *ex officio*
Ralph G. Hurlin
Horatio M. Pollock
Thorsten Sellin
Casimir A. Sienkiewicz
Willard L. Thorp

* With terms expiring at the end of 1937, 1938, 1939, 1940 and 1941, respectively.

† Appointed in accordance with By-Law 5 to supervise the investment of the Association's surplus funds.

‡ Formerly the Committee to Stimulate and Coordinate Research.

Advisory Committee on the Census

Robert E. Chaddock, *Chairman*
Murray R. Benedict
Paul T. Cherington
J. Frederic Dewhurst
Frederick C. Mills
William F. Ogburn

Committee on Census Enumeration Areas

Howard W. Green, *Chairman*
Clarence E. Batschelet
Robert E. Chaddock
Neva R. Deardorff
Calvert L. Dedrick
Ernest M. Fisher
Leon E. Truesdell

Committee on Statistics of Delinquents and Criminals

Thorsten Sellin, *Chairman*
Ronald Beattie
G. E. Gehlke
Rolf T. Harbo
R. R. Lutz
Morris Ploscowe
Barkev S. Sanders
George B. Vold

Joint Committee on Income Tax Statistics (With American Economic Association)

W. Leonard Crum, *Chairman*
J. Franklin Ebersole*
Ralph C. Epstein*
David Friday
Robert M. Haig*
Simon Kuznets

Committee on Industrial Statistics

Willard L. Thorp, *Chairman*
Charles A. Bliss
C. R. Chambers
Stephen M. DuBrul
Joseph B. Hubbard
Leonard Kuvin
Howard H. McClure
Claudius Murchison

Committee on Labor Statistics

Casimir A. Sienkiewicz, *Chairman*
Ewan Clague
Carroll R. Daugherty
Margaret Elliott
O. A. Fried
Meredith B. Givens
Aryness Joy
Solomon Kuznets
Gladys L. Palmer
Eugene B. Patton
William H. Stead
Sidney W. Wilcox

Committee on Statistics of Institutions for Mental and Physical Disorders

Horatio M. Pollock, *Chairman*
G. W. Baehne
Frederick W. Brown
Kate H. Claghorn
Mary Augusta Clark
Emil Frankel
Carl E. McCombs
Elliott H. Pennell
David M. Schneider

* Appointed by the American Economic Association.

*Committee on Relief Statistics**

Ralph G. Hurlin, *Chairman*
Neva R. Deardorff
William Haber
Saya Schwartz
Herman M. Somers
Frederick F. Stephan
Paul Webbink

Committee on Statistics of Dependent Children in Foster Care

Neva R. Deardorff, *Chairman*
Raymond F. Clapp
Emil Frankel
Morris J. Karpf
A. Wayne McMillen
Robert J. Myers
David M. Schneider
Emma Winslow
Helen Witmer

Committee to Appraise the Statistical Evidence of the Causes of the 1929–1932 Business Collapse

Willford I. King, *Chairman*
Seymour L. Andrew
William A. Berridge
Robert W. Burgess
Paul T. Cherington
John H. Cover
Garfield V. Cox
Carroll W. Doten
George J. Eberle
J. F. Ebersole
Ralph C. Epstein
Alfred T. Falk
Irving Fisher
F. Leslie Hayford
Stanley B. Hunt
Harry Jerome
Edwin W. Kemmerer
Wesley C. Mitchell
Otto Nathan
Frank A. Pearson
Horatio M. Pollock
John R. Riggleman
George B. Roberts
Norman J. Silberling
Laurence H. Sloan
Bradford B. Smith
Carl Snyder
Ralph J. Watkins
Ray B. Westerfield

Committee on Biometrics

Lowell J. Reed, *Chairman*
Joseph Berkson
Robert E. Chaddock
Selwyn D. Collins
John Collinson
J. V. DePorte
Alfred J. Lotka
Hugo Muench, Jr.
Richard E. Scammon

Committee on Sociometrics

George A. Lundberg, *Chairman*
F. Stuart Chapin
Calvert L. Dedrick
Stuart A. Rice
Samuel A. Stouffer
Dorothy S. Thomas
George B. Vold

Committee on an Annual Review of Progress in Mathematical Statistics

Paul R. Rider, *Chairman*
Burton H. Camp
Cecil C. Craig
Walter A. Shewart
Samuel S. Wilks

* Authorized to act with the Committee on Statistical Forms and Procedures of the American Public Welfare Association as a Joint Committee on Relief Statistics.

Representative on the Board of Directors of the National Bureau of Economic Research

Winfield W. Riefler

Members of the Social Science Research Council

Edwin B. Wilson (*For the term expiring December 31, 1937*)
William A. Berridge (*For the term expiring December 31, 1938*)
Stuart A. Rice (*For the term expiring December 31, 1939*)

Representative on the Council of the American Association for the Advancement of Science

William F. Ogburn

Representative on the Business Research Council

Donald R. Belcher

Representative on the Board of Directors of the New York Management Council

C. M. Armstrong, Jr.

Representative on the National Conference on Nomenclature of Disease

George H. Van Buren

Representative on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

Walter A. Shewhart

Representative on the Sectional Committee on Standards for Graphic Presentation

A. H. Richardson

Representative on the Conference on National Income and Wealth

Aryness Joy

Report of the Advisory Committee on the Census

The Census Advisory Committee, it may be recalled, has been reorganized on a new basis the past year and is now exclusively a committee of the American Statistical Association instead of being, as formerly, a joint committee of that Association and the American Economic Association. All members of the Committee are now appointed by the Board of Directors of the Statistical Association, which formerly appointed only three out of six, the other three being appointed by the Economic Association.

The duties of the Committee as defined by the Board of Directors remain substantially unchanged. Its primary function "is to advise with the Director of the Census either on his own initiative or that of members of the Committee with a view to promoting improvements in census procedures and data. It is authorized to consider means of improving conditions bearing upon the effectiveness of census procedures which may be beyond the

power of the Director to alter, to make relevant recommendations, and to transmit these to the Director of the Census, the Board of Directors of the Association, or both. It is invited to bring the attention of the Board, with its recommendations, any matters on which it believes that the American Statistical Association should take an official position. Except on instructions by the Association or its Board of Directors, the Committee is not authorized to speak for the Association as such."

The Committee has, however, a further function or responsibility not previously required of it, since at the request of the Director of the Census it will hereafter review and pass upon the recommendations of any special census committees, such as the Committee on Vital Statistics or that on Financial Statistics of States and Cities.

Two meetings of the Committee were held the past year—one on April 2 and 3 and the other on October 8 and 9.

The April meeting was devoted mainly to acquainting the new members with the organization and functions of the Census Bureau. The heads of the various divisions were successively called into the meeting to tell the Committee about their work, plans, and problems; and the Committee was shown the mechanical equipment of the Bureau.

The October meeting was devoted mainly to the consideration of legislation and plans for future censuses and other statistical compilations. A bill has been drafted within the Bureau providing for the regular decennial census to be taken in 1940 and every tenth year thereafter; also for a census of population, employment, unemployment, and agriculture to be taken in the fifth year following the decennial census; also for a quinquennial census of industry and business to be taken in 1943 and every fifth year thereafter, and to include such "basic statistics of manufacturing and extractive industries and of business, commercial, mercantile, service, and professional enterprises as the Director of the Census deems necessary for the promotion of industrial, business, and commercial welfare of the nation." The bill makes provision also for annual surveys on agriculture in intervals between censuses, and for the collection (monthly, quarterly, semi-annually, or annually) of basic statistics on industrial and business activities. In its main outlines this program of inquiries has already been approved by the former Census Advisory Committee.

Under this bill the regular decennial census in 1940 will cover population, employment and unemployment, housing, agriculture, irrigation, drainage, and horticulture.

The attention of the Committee was called to certain questions that are likely to be urged upon the Bureau for inclusion in the next population census involving the danger of overloading the schedule. This, it was felt, was a matter requiring careful consideration, and the Committee did not feel prepared or called upon to make any definite recommendations at this time regarding the questions that should be included. Other matters brought to the attention of the Committee included the date of the next

decennial census, the question of a census of housing, the use of trial schedules for the census of agriculture, the definition of a farm, and the advisability of securing statistics of farm products consumed on the farm.

The Committee reviewed and approved with some minor revisions certain resolutions adopted by the Special Committee on Vital Statistics. One of these recommended that a study of accidents be conducted as a series of sample inquiries over limited periods of time in cooperation with the several states.

The Committee considered also the set of resolutions adopted at a recent meeting of the Special Committee on Financial Statistics of States and Cities but felt that these should be given more study and required some redrafting before being approved.

The Director of the Census requested the views of the Committee regarding the cooperative arrangement recently entered into by the Bureau of the Census and the Bureau of Foreign and Domestic Commerce in regard to the compilation of current business statistics. The Census Bureau has for many years been engaged in the compilation—monthly, quarterly, or annually—of statistics showing the production, sales, or stocks on hand of various commodities, the list of which has steadily grown. The basic data are obtained for the most part from commercial or trade organizations or individual manufacturers reporting on a purely voluntary basis. Recently the question was raised of transferring this branch of the Bureau's work to the Bureau of Foreign and Domestic Commerce. This question was studied by a committee appointed by the Central Statistical Board. Hearings were held and attended by representatives of the two Bureaus; and the cooperative arrangement finally entered into is essentially along the lines recommended by that committee.

The arrangement is that the Bureau of the Census shall collect and compile the primary current business data; that the analysis, interpretation and publication of these data shall be the function of the Bureau of Foreign and Domestic Commerce; and that the selection of the series and form of inquiry shall be determined by a joint committee consisting of officials of both Bureaus and a representative of the Central Statistical Board.

The Advisory Committee, acting on the recommendation of a subcommittee appointed by the Chairman, expressed their approval of this cooperative arrangement placing emphasis upon the plan for having a joint committee to determine the series and form of the inquiries.

The Census Advisory Committee is now one of several committees in the Statistical Association concerned with the statistical activities of the Federal government. An effort is being made to cooperate with these other committees of the Association, so far as their work and interests relate to the activities of the Census Bureau. By joint meetings with the members of one or more other committees, in addition to the official sessions of the Committee at Washington, and by interchange of views, we hope to stimulate study

of the problems of the Census Bureau and to encourage carefully considered suggestions and recommendations to the Director, which may be transmitted either through the Advisory Committee or directly to the Bureau.

ROBERT E. CHADDOCK, *Chairman* — J. FREDERIC DEWHURST
MURRAY R. BENEDICT — FREDERICK C. MILLS
PAUL T. CHERINGTON — WILLIAM F. OGBURN

Report of the Committee on Census Enumeration Areas

The Committee on Census Enumeration Areas has been able to interest people in almost all the cities of a quarter of a million or more inhabitants in census tracts to the extent of preparing the necessary census tract maps for the approval of the Bureau of the Census. Practically all of these cities either have obtained official approval for their census tracts or are in the process of revising their maps so that approval may be gained.

A revised edition of the Census Tract Manual was published in July. This manual, prepared by the Chairman of the Committee and Doctor Leon E. Truesdell, Committee member, has aided people in various cities in preparing census tract maps and street indexes.

It is expected that several additional cities will become sufficiently interested to lay themselves out in census tracts during the next six or seven months. It is also expected that some of the older cities will desire to extend their census tracts to include adjacent suburbs. The Committee stands ready to be of help to such cities.

A midsummer meeting of the Committee was held in Washington for the purpose of discussing problems relating to census tracts presented by the Central Statistical Committee and the Works Progress Administration.

A midwinter meeting of the Committee will be held in Atlantic City. Representatives of 65 census tract cities or cities intensely interested in becoming census tract cities have been invited to this Atlantic City meeting as scheduled in the Association's program.

The Committee is still faced with such problems as those summarized below:

1. The creation of a broader use of census tract data within each census tract city: use by more organizations and in more different ways
   (a) By making census tract maps
   (b) By preparing and publishing a useable street index by which social and business data may be readily allocated to census tracts
   (c) By demonstrating a variety of possible local uses
2. The preparation of definite recommendations regarding table forms which will be most useful to local communities in 1940 based on extensive experience with the 1930 forms and from the standpoint of local community interests.
3. The problems encountered in subdividing the less densely populated areas surrounding large cities

These problems are not yet solved, but progress is being made toward their solution.

It is believed valuable to continue the activities of this Committee for the promotion of the census tract idea both in new census tract cities and in those that have census tracts but have not taken full advantage of this "statistical tool."

HOWARD WHIPPLE GREEN, *Chairman*
CLARENCE E. BATSCHELET
ROBERT E. CHADDOCK
NEVA R. DEARDORFF
CALVERT L. DEDRICK
ERNEST M. FISHER
LEON E. TRUESDELL

Report of the Committee on Statistics of Delinquents and Criminals

The Committee has during the past year been very closely in touch with the work of the Bureau of the Census in the collecting and tabulation of judicial criminal statistics and the annual statistics of prisoners.

The criminal statistician of the Bureau and the chairman of the Committee have met on several occasions to discuss the problems involved.

The Committee, furthermore, has taken the initiative in urging that the census of institutions, which would ordinarily be taken in 1943, be taken in 1940 in order that a firmer population basis may be secured for the computation of ratios.

THORSTEN SELLIN, *Chairman*
RONALD BEATTIE
G. E. GEHLKE
ROLF T. HARBO
R. R. LUTZ
MORRIS PLOSCOWE
BARKEV S. SANDERS
GEORGE B. VOLD

Report of the Committee on Statistics of Institutions for Mental and Physical Disorders

The Committee has met but twice in the past year. In consequence, it has been able to do little more than maintain contact with other agencies having the same statistical objectives, and through its individual members at work in related fields of state and national administration aid in the advancement of the Committee's general program.

This general program contemplates the establishment of a registration area for social welfare statistics, covering primarily the activities carried on by the Social Security Board, and the drafting of a model law for social welfare statistics especially adapted to the requirements of the institutional services with which the Committee is concerned. In furtherance of this purpose the Committee submitted a memorandum embodying these proposals to the Special Committee on Accounting and Statistics of the National Conference of Social Work at its annual session in Indianapolis in May of the

current year. No formal action, however, was taken by such Committee on the proposals submitted.

In view of the interest shown by the surgeon general, Dr. Thomas Parran, in the compilation of more uniform and comprehensive statistical data on the hospitals of the United States, and to aid him in this work, your Committee offered its cooperation to the surgeon general and requested the designation of a member of his staff to meet with the Committee. Mr. Elliott H. Pennell, who was so designated, has recently been appointed a member of the Committee. This cooperative relationship with the surgeon general's office offers an opportunity in the field of hospital statistics of which the Committee plans to take immediate advantage.

To further the Committee's plan for more complete and accurate statistics of hospitals throughout the country, the chairman has appointed a special subcommittee, under the chairmanship of Dr. Carl E. McCombs of the Institute of Public Administration, which includes Mr. Elliott H. Pennell of the surgeon general's office, to review the field of hospital statistics and work out during the coming year a simple hospital schedule which can be used by the surgeon general's office if desired or by other official and unofficial agencies concerned in the compilation of the minimum statistical data needed on the hospital services and facilities of the country. It is the Committee's view that in the hospital field simplification of statistical schedules is essential, because of the extremely wide variations in the types of hospital services rendered, their methods of accounting and record keeping, and the general lack of competent statisticians in the hospitals themselves. Accordingly the Committee proposes to limit the scope of its statistical effort in the hospital field to those data which can be uniformly and accurately recorded by hospital record clerks for the purposes of an annual statistical summary of hospital location, personnel, bed capacity, movement of population, income and expenditure, as a minimum. The preparation of a simple manual of instructions for compiling such statistical matter is contemplated.

Members of the Committee working individually in their respective fields of interest have continued to make material contributions to the betterment of hospital and other institutional statistics during the year. Among these contributions, special mention should be made of the work of Mr. Frederick W. Brown, as adviser to the Census Bureau, on statistics of hospitals for mental diseases and disorders, the reports of Dr. Emil Frankel, of the New Jersey Department of Institutions and Agencies, on trends in general hospital services in New Jersey, 1929–1936, and the work of Dr. David M. Schneider, of the New York State Department of Social Welfare in the development of uniform comprehensive statistics on the hospital services of New York State.

HORATIO M. POLLOCK, *Chairman*
CARL E. MCCOMBS, *Secretary*
GEORGE W. BAEHNE
FREDERICK W. BROWN
KATE H. CLAGHORN
MARY AUGUSTA CLARK
EMIL FRANKEL
ELLIOTT H. PENNELL
DAVID M. SCHNEIDER

Report of the Joint Committee on Relief Statistics

The Joint Committee on Relief Statistics, appointed by the American Statistical Association and the American Public Welfare Association, continued its interest in developments in the field of relief statistics throughout the United States. Meetings and committee discussions were held frequently during the year. The Committee also conducted four open meetings for discussion of problems of relief statistics, two in connection with the National Conference of Social Work held in Indianapolis in June, one during the conference of the American Public Welfare Association in Washington on December 11, and one during the annual meeting of this Association at Atlantic City on December 29. Three numbers of an informal *Bulletin of Information for Relief Statisticians* were issued during the year. This bulletin, which was inaugurated last year, appears to be serving a very useful function in keeping relief statisticians and others informed of new statistical developments in various fields of relief activity. It is now being distributed to about 400 persons. At the end of the year plans are completed for the publication of a series of papers dealing with practical problems in the compilation and use of relief statistics, the first number of which will be published in January.

The Committee has continued as last year to serve as an official advisory committee to the Division of Public Assistance Statistics of the Social Security Board. It has also given advisory service to the Works Progress Administration, the Special Senate Committee on Relief and Unemployment, and to certain state relief agencies. The Committee has given special consideration to the need for the preparation of consolidated statistics of the various federal relief programs and is able to report much progress in the production of such statistics within this year. At the end of the year special attention is being given to the need for developing standardized detailed statistics of large city relief operations, which have been entirely lacking heretofore.

RALPH G. HURLIN, *Chairman*
PAUL WEBBINK, *Secretary*
NEVA R. DEARDORFF
EMIL J. FRANKEL
HARRY GREENSTEIN
WILLIAM HABER
HELEN R. JETER
HOWARD B. MYERS
SAYA M. SCHWARTZ
HERMAN M. SOMERS
FREDERICK F. STEPHAN

Report of the Committee on Labor Statistics

A conference to consider problems of occupational classification, the need for comparability in occupational statistics, and the practicability of a general-purpose classification framework was held in Philadelphia on April 23, 1937. The proposal to call this conference arose in a meeting of the Committee on Labor Statistics held in 1936, and the plans for the conference were developed by members of the Committee following that meeting. The program was arranged by a sub-committee consisting of Gladys L. Palmer,

Chairman, Margaret Elliott, Philip M. Hauser, Solomon Kuznets, and William H. Stead. A brief report of the conference was published in the May 1937 bulletin issued by the Association.

The conference made recommendations regarding the collection of the basic data for occupational statistics and the need of continued research on definitions of occupational terms used both for classifying jobs and for classifying persons in relation to the occupation of their usual or last employment. It was recognized that different sources of information created different problems in initial classification and coding.

The conference considered that the problem of securing convertibility between classifications at any desired level of detail necessitated the use of a universal basic code. They recommended further research on the nature of the differences between occupational codes now in general use and experimentation in cross-classification analysis of a given set of data in which the items are convertible. The desirability of developing occupational classifications in relation to classifications of industry and the status of the person as an employer, employee, unpaid family worker, or self-employed person was also stressed.

Following the conference, several informal meetings were held in Washington to consider the next steps that might be taken to increase the comparability between occupational classifications now in use. Two definite projects were outlined and tentative arrangements were made whereby these projects would be undertaken by the agencies primarily concerned.

Recognizing that the work of the Committee on Labor Statistics touches that of the Advisory Committee on the Census on several points, arrangements have been made for a joint meeting of the two committees early in January 1938.

C. A. SIENKIEWICZ, *Chairman*

Report of the Committee on Industrial Statistics

The Committee on Industrial Statistics has been inactive during the past year. The emergency conditions under which it was created appear largely to have disappeared. While there has been some discussion of this Committee acting in an advisory capacity to certain of the Government agencies, we do not believe that this possibility justifies the continuance of the Committee. If the Association should be requested to provide such an advisory committee, a new committee could easily be established. We therefore recommend our discontinuance.

However, the Committee does wish to recommend to the Board of Directors that an award be established for outstanding trade association statistical work. The trade association is frequently at the center of industrial statistics. The members of an industry are able to judge a statistical program in terms of its immediate utility, but are not able to evaluate it from the point of view of statistical standards. The purpose of the award would

be to recognize and encourage high-grade statistical work by trade associations. A definite plan for two awards has been transmitted to the officers of the Association. The first award for excellence in statistical work would recognize a strong, solid statistical program, although it might have been in operation without major change for a considerable period of time. The second award would be given for an outstanding contribution during the year, either in the form of a marked improvement or development of new data or in some special study worthy of recognition. In both cases the work would not need to have been done exclusively by the staff of the association, but it would have to be sponsored by and properly credited to the association responsible for its accomplishment.

WILLARD L. THORP, *Chairman* JOSEPH B. HUBBARD
CHARLES A. BLISS LEONARD KUVIN
C. R. CHAMBERS HOWARD H. MCCLURE
STEPHEN M. DUBRUL CLAUDIUS MURCHISON

Report of the Joint Committee on Income Tax Statistics

The Committee has held no stated meeting during the year. The Chairman, at the request of the Treasury, met with representatives of the Treasury and particularly of the Bureau of Internal Revenue in February, 1937, to confer concerning changes in the tabulation of corporation data for 1936, necessitated by the Revenue Act of 1936. The changes made here were not in general deep-reaching but took account of the new kinds of information which were given effect by the 1936 Act. The Chairman called informally certain other members of the Joint Committee about some of those changes but did not regard the matter as of sufficient complexity to warrant a general meeting of the Committee.

During the autumn, the Treasury asked the Chairman to reopen on a broad scale the entire question of tabulations of statistics of income and to appoint a Committee within the Treasury, of which the Chairman of our Joint Committee would be Chairman, to survey the whole case. Current emergencies in the Treasury have prevented the institution of this new committee but the Chairman expects to appoint such a committee in the near future, and, in connection with the work of that committee within the Treasury, the Joint Committee will be called together to participate in a general overhauling of existing tabulations, both for corporations and individuals. It is probable that the new set of changes will be worked out early in 1938 and be used for tabulation of 1937 data and the changes will be more extensive and important than those introduced in 1931.

W. L. CRUM, *Chairman* DAVID FRIDAY
J. F. EBERSOLE* ROBERT M. HAIG*
RALPH C. EPSTEIN* SIMON KUZNETS

* Appointed by the American Economic Association.

Report, by the Chairman, of the Progress made by the Committee on the Statistical Evidence Concerning the Causes of the 1929–1932 Business Collapse

On May 16, 1936, the Board of Directors of the American Statistical Association authorized the formation of a Committee to Appraise the Statistical Evidence Concerning the Causes of the 1929–1932 Business Collapse. This Committee was constituted because of the feeling on the part of some members of the Board that, at the present time, a considerable number of statistical facts relating to the causes of depression have been so thoroughly established that they are accepted by a large majority of leading members of the statistical fraternity. It was felt that, if this condition should prove to be true, a public service might be rendered by ascertaining just what statistical evidence is so accepted. With this end in view, a committee consisting of the following members was appointed:—

Willford I. King, *Chairman*
Irving Fisher
Horatio M. Pollock
John R. Riggleman
Frank A. Pearson
Ralph C. Epstein
Bradford B. Smith
John H. Cover
Garfield V. Cox
Ray B. Westerfield
Leonard P. Ayres
Wesley C. Mitchell
A. T. Falk
Harry Jerome
Leo Wolman
Ralph J. Watkins
Norman J. Silberling
Edwin W. Kemmerer
Otto Nathan
Carl Snyder
Edwin B. Wilson
George J. Eberle
George B. Roberts
William A. Berridge
Robert W. Burgess
Paul T. Cherington
F. Leslie Hayford
Laurence H. Sloan
Stanley B. Hunt
Carroll W. Doten
J. F. Ebersole
S. L. Andrew

The Committee was purposely made large in order to make it as representative as feasible of the statistical opinion of those members of the Association especially interested in questions relating to the business cycle.

Because of the size of the Committee, it did not seem feasible to make progress at a meeting unless steps could first be taken to clear the ground and determine what points of agreement existed and what differences were in need of discussion. As a preliminary measure, therefore, the Chairman sent out to the members of the Committee 22 specific propositions. Each one of these propositions was accompanied by charts, tables, or both, believed to assist materially in establishing the validity of the proposition. It was, of course, assumed that the members of the Committee would view the statistical evidence presented in the light of their knowledge of other statistical evidence and other events in general.

Each member of the Committee was requested to vote in one of three ways:—

1. That the statistical evidence is adequate to establish the validity of the proposition.
2. That the validity of the proposition would be established, provided the proposition were amended in a way specified by the voter.
3. That the statistical evidence is not sufficient to establish the validity of the proposition. Each voter was asked to state his reasons for believing the evidence was insufficient.

The process of canvassing the Committee took considerable time. On the first 18 propositions, 29 members eventually sent in their votes, though on some of them only 27 or 28 voted. On the last 4 propositions the maximum number of votes cast was 23.

The propositions, and the votes as recorded, are as follows:—

PROPOSITION I

In the years immediately preceding the 1929–1932 decline, the volume of physical production in the United States did not, to any *unusual* extent, rise above its long-time trend, as indicated by the data for the years 1860–1930.

Twenty-nine members voted on this proposition. Of this number 18 believed the proposition valid in general, though some members note exceptions in the case of certain industries. Two hold that the trend from 1860 to 1930 cannot be considered representative of the long-time forces governing American industry. Nine consider the evidence on the proposition unconvincing.

PROPOSITION II

In the years immediately preceding the 1929–1932 decline, stocks of goods on hand in the United States did not, in general, rise to any *unusual* extent above their long-time trends.

Twenty-nine members voted. Of these, 14 members hold the proposition probably true, but 4 of these consider the evidence inconclusive. Fifteen believe either that the evidence is non-representative of commodities in general, or that the period 1919 to 1930 is too short to indicate the long-time trend.

PROPOSITION III

Larger than usual stocks of cotton were on hand before the 1928–1929 boom. Since they did not prevent the development of the boom, it is unlikely that they were a primary initiating cause of the 1929–1932 decline.

Of the 28 members voting on this proposition, 16 approve it. Of the other 12, more object to the conclusion than to the statistical evidence. Some apparently feel that, even though the presence of large stocks of cotton did not prevent the boom, they may have contributed to the collapse which followed.

PROPOSITION IV

Abnormal accumulation of stocks of copper began with the depression and did not precede it.

Twenty-eight members voted on this proposition. Of these, 18 believe the evidence sufficient to establish the proposition. Some of the others are in doubt concerning the adequacy of the data. Two point out that the stocks recorded were mainly those in the hands of producers, and that these stocks might not be typical of the stocks in the hands of consumers of copper.

PROPOSITION V

In the years immediately preceding the 1929–1932 decline, overcapacity, as computed on the basis of effective demand, was, in general, not abnormally large in the manufacturing field.

Of the 28 members voting on this proposition, 17 agree with the findings of the Brookings Institution investigators that, at the time specified, overcapacity was, in most fields of manufacturing, not larger than normal. Most of those failing to approve this proposition refuse to do so because they believe that the evidence presented must, necessarily, be based upon factors not really subject to measurement.

PROPOSITION VI

In the period immediately preceding the 1929–1932 decline, the volume of unemployment among able-bodied workers was small.

Twenty-eight members voted on this proposition. Of these, 21 agree that there was but little unemployment in the early part of 1929. Four others agree that the statement is probably not far from the truth. Three believe the evidence unconvincing.

PROPOSITION VII

In the years immediately preceding the 1929–1932 decline, the proportion of the national income invested in production goods was not abnormally large, at least as compared to other post-war years.

Of the 28 members voting on this proposition, 19 agree that the evidence is convincing. Two question the definiteness of the term "production goods." One doubts the accuracy of the statistics, and six are unconvinced by the charts presented.

PROPOSITION VIII

In the United States, in years immediately preceding depressions, the volume of bank credit has nearly always risen well above its short-time trend, and also above its long-time trend.

Of the 28 members voting on this propositions, 21 believe the evidence adequate. Two feel that, while the proposition may be true, it is not significant. Two consider the proposition probably true, but the statistics inadequate. Three are unconvinced by the charts presented.

PROPOSITION IX

Before the 1929 crash, there was an unusual expansion in the volume of brokers' loans.

Out of the 29 voters, 25 agree to the proposition. The other four are apparently deterred from approving by the fact that data for years before 1923 were not presented for their consideration.

PROPOSITION X

The 1929 crash was preceded by an unusually sharp increase in the velocity of circulation of bank deposits, especially in New York City.

Of the 29 voting on this proposition, 23 agree that velocity, especially in New York City, increased sharply before 1929. Two feel that the increase outside New York City was not "sharp." Four believe that the short time covered by the evidence makes it impossible to say how "unusual" the increase was.

PROPOSITION XI

That the crash leading to the depression resulted from some quick-acting force is indicated by the suddenness of the onset of the depression.

Of the 29 voters, only 9 consider this proposition established. Nine others believe that the decline, though sudden, may well have represented merely a crash caused by a slow accumulation of forces, the weight of which finally passed the breaking point. Eleven object on miscellaneous grounds.

PROPOSITION XII

Production collapsed in 1929 because of a shrinkage in demand—that is, because new orders for goods were not forthcoming.

Of the 28 members voting, 17 agree that failure in demand was the immediate cause of the collapse, but three of these point out that the failure was marked mainly in the field of indirect and durable goods rather than in the field of perishable consumable goods. One member while agreeing that failure of demand was probably the immediate cause believes that the question of real importance is why demand failed. One other feels it possible that *fear* of failure of demand might have caused production to shrink even before new orders began to fall off. Four believe that shrinkage in demand was but one of the forces responsible for the decline in business. Five express doubt as to the validity of the proposition.

PROPOSITION XIII

One important reason for the collapse in the demand for corporate stocks and goods in general was the curtailment in the volume of buying on credit—such curtailment being due either to the exhaustion of the credit of the potential buyer, or to a decline in optimism concerning the future outlook for business.

Of the 29 voters, only 11 are convinced that either exhaustion of credit

or a decline in optimism, with a resultant shrinkage in credit buying, caused the sharp contraction in the volume of new orders for goods. Two others feel that the forces cited were but partially responsible for the decline in orders. Most of the other 16 feel that the decline in optimism and purchasing on credit might, in reality, not have been causal factors, but merely resultants of other forces.

PROPOSITION XIV

Nervousness concerning the future of stock prices was due largely to the unusual altitude reached by price-earnings ratios.

Of the 28 members voting, 15 believe that nervousness concerning stock prices was caused largely by the unusual altitude of the price-earnings ratios. Three others feel that this point of view ascribes too high a degree of rationality to the actions of stock speculators. Ten members are in doubt.

PROPOSITION XV

The shrinkage in the volume of stock buying on credit followed a period in which the ratio of brokers' loans to the national income had risen to an unusual height. Therefore, overexpansion of credit may have been partly responsible for the later shrinkage in the volume of stock purchasing on the basis of credit.

Of the 27 votes cast, 19 indicate a belief that overexpansion of credit, and hence, possibly, exhaustion of the credit of the buyers may have been a material factor in producing the shrinkage which occurred in the volume of stock purchasing on credit. Eight are either in doubt or feel the evidence inconclusive.

PROPOSITION XVI

The collapse in general production and employment followed the collapse in buying on credit and also the collapse in new orders.

Reference to the chart shows that brokers' loans began to decline sharply in October, 1929, while the steep decline in general production came a month later.

New orders reached their peak in March, 1929, and were well on their way down before employment started to slump severely in November.

Automobile credit was falling off rapidly in August and September, while production and employment showed no marked downward tendency before November.

Of the 28 voters, but 13 subscribe to the approximate correctness of all the statements in this proposition. Two others agree with most of the statements. Thirteen others are not convinced by the evidence.

PROPOSITION XVII

The intensity of the depression was accentuated by the fact that numerous banks failed and thereby curtailed the buying power of their depositors. Furthermore, such failures frightened other buyers, even though these other buyers lost nothing through the failures.

Of the 29 voting on this proposition, 24 agree to the validity of the statement. The other 5 emphasize the fact that the last statement in this proposition represents nothing more than an inference.

PROPOSITION XVIII

The decline in business was accentuated by the fact that, as the total dollar demand for their products shrank, manufacturers (especially those making durable production goods) did not reduce prices on their products sharply enough to keep up their usual volumes of sales, and did not cut hourly wage rates enough to keep up their usual volumes of employment. The resulting unemployment not only reduced the buying power of those laid off, but, by frightening those still employed, caused them to curtail their purchases.

Of the 28 voters, 14 give general approval to the proposition. Two others approve all but the last sentence of the statement. A number of the remaining 12 stress the fact that demands for different types of goods differ greatly in elasticity, and that no reasonable reductions in the prices of certain indirect goods would be likely to increase markedly the volumes of such goods sold, for the orders for such indirect goods are based primarily upon activity in preparing consumption goods.

PROPOSITIONS XIX AND XX (not submitted)

PROPOSITION XXI

With few exceptions, a high correlation exists between any marked price-change and the subsequent volume of trade and employment. The more marked the price-change, the more marked the correlation. For the period from December 1918 to August 1922, inclusive, the fluctuations of the volume of trade followed almost precisely the course they should, if assumed to be guided solely by antecedent price-change. The correlation between T (volume of trade) and P (price-change after a lag duly distributed) was 0.972.

On this proposition, 23 members voted. Of this number, 9 endorsed the proposition as stated; 6 others agreed in principle, but desired modifications in the wording; and 8 felt the evidence to be unconvincing.

PROPOSITION XXII

Countries on a common monetary standard usually experience like movements in the wholesale prices of articles entering largely into international trade.

This proposition was supported by 13 of the 22 members voting on it. The dissidents objected mainly on the ground that the evidence presented covered too few years to be conclusive.

PROPOSITION XXIII

In countries having unlike monetary standards, the movements of index series representing the prices of goods commonly entering into international trade are often very dissimilar.

Of the 21 members voting on this proposition, 14 held it to be valid. Some of the remaining 7 felt that the evidence was inconclusive, while others voted "No" because they feared erroneous implications would be drawn from the statement.

PROPOSITION XXIV

In any two countries that differ in monetary standards, the divergence in their price levels, as measured by commodities commonly entering into international trade, usually corresponds in a broad way with the divergence between the monetary standards of the two countries. This principle really includes as a special instance, the case of countries on the same monetary standard. In these countries, the divergence in price levels is apt to be negligible.

On this proposition, 22 members voted. Of this number, 14 considered the principle reasonably well established. Several of the 8 who were unconvinced felt that the proposition could not be established without presenting data for longer periods and more countries.

GENERAL CONCLUSIONS

From the votes recorded, it is clear that only a few of the propositions presented were supported by an overwhelming majority of the Committee. Of the 22 propositions submitted, 8 were favored by at least two-thirds of those voting, and 7 more commanded the support of three-fifths of the voters. In all, 16 propositions were approved by a majority of those voting, the remaining 6 failing to win majority approval.

The propositions cover a wide range. Opposition to the different propositions as stated is based upon a great variety of grounds. Under the circumstances, it appears that there would be little hope of securing from the Committee a statement acceptable to all the members unless the Committee met and worked vigorously for several weeks. Because of lack of funds to cover the expenses of such a conference, and because, presumably, few of the members would be willing or able to devote the needed time to it, the only feasible procedure seems to be to submit this report based upon the votes and expressed opinions of the voting members.

The chairman recommends that the committee be not reappointed.

WILLFORD I. KING, *Chairman*

Report of the Committee on Biometrics

The Committee on Biometrics was appointed in the fall of 1935 following some preliminary discussions between Dr. Joseph Berkson of the Mayo Foundation, Professor Lowell J. Reed of the Johns Hopkins University and Mr. Frederick F. Stephan, Secretary of the American Statistical Association, as to the possibility of establishing within the Association a Biometric Section to be devoted to biological applications of statistics.

At the Annual Meeting in December 1935 the Committee met with other

members of the Association to discuss the proposal. The response of the group was very favorable. Following this meeting a circular questionnaire was sent to a larger group of some 300 persons, members of the Association and others who might be interested, asking for a general reaction to the proposal and specifically whether they would attend a meeting of the Committee to be held at the time of the 1936 Annual Meeting of the Association in Chicago.

The replies indicated very definitely the soundness of the project. The meeting was held on December 27, 1936, with Dr. Reed acting as Chairman. Thirty-four persons attended, representing a considerable variety of biologic interests and a wide geographical distribution of the country. After a review of the purposes of the meeting by the chairman, Mr. Stephan spoke to the group on behalf of the ASA. He informed the group that conversations with the responsible officers of the Association indicated that the formation of a Biometric Section was looked upon very favorably and that cooperation of the Association was assured. He explained that an amendment to the Constitution providing authority for the establishment of sections was to be presented for approval at the Annual Business Meeting but that it could not be adopted until the next Annual Meeting. He suggested that pending the formal establishment of a biometric section, the Committee could go forward with its plans and activities as though the section were established and with the cooperation of the officers and other members of the Association. Specifically, he invited the organization of a biometric program for the next Annual Meeting of the Association and promised to make place for it on the general program. Professor Snedecor suggested that the section be called the "Bio-statistics" rather than the "Biometric" section, but this suggestion was not favorably received. Dr. Reed, as Chairman, Dr. Berkson, as Secretary, and Professor Snedecor were instructed by the Committee to continue and carry forward appropriate plans for a program at the 1937 Annual Meeting.

During 1936 Dr. Reed, Dr. Berkson, and Professor Snedecor had arranged a program for the 1936 Annual Meeting in addition to the meeting of the Committee. It included a round table on vital statistics in relation to the 1940 census and two sessions for the presentation of scientific papers on Vital Statistics and on Statistical Methods for Experimental Data. These sessions proved to be of very considerable interest.

One of the organizational problems which the Committee discussed was the overlapping of interests of the biometric section with other organizations, such as the American Association for the Advancement of Science and the American Public Health Association. To meet this the idea of joint meetings with such associations was put forward. Several members of the biometric group who were interested in population problems proposed such a session with the American Public Health Association. The proposal was accepted and a joint meeting was held with the Vital Statistics Section of the APHA on October 8, 1937, at the Hotel Pennsylvania in New York

City. The program covered various statistical aspects of studies on population, and the meeting was a notable one, both from the point of view of the fine quality of the papers and the attendance.

During the year plans were completed for a biometric program for the 1937 Annual Meeting of the ASA. Dr. Halbert Dunn, Chief of the Bureau of Vital Statistics, having been meanwhile elected Vice-President of the ASA, with responsibilities to include biometry and vital statistics, became the liaison officer between the Biometric Committee and the Association. Papers were solicited by the secretary of the Committee as well as by Dr. Dunn, prospective titles reviewed, and a program finally arranged consisting of twelve papers to be given at three sessions of the Annual Meeting in Atlantic City, December 28–29, 1937.

JOSEPH M. BERKSON, *Secretary*

Committee on an Annual Review of Progress in Mathematical Statistics

The Committee on an Annual Review of Progress in Mathematical Statistics met at the Commodore Hotel, New York City, Friday afternoon, February 12, 1937. Present were Burton H. Camp, Paul R. Rider, Walter A. Shewhart, Frederick F. Stephan, and S. S. Wilks.

It was decided that instead of proceeding with an annual review, such as that of J. O. Irwin published in the *Journal of the Royal Statistical Society*, it would be better to have reviews of different topics, starting from the beginnings and carrying the developments up to date. The Committee deemed it advisable to have some of these topics discussed at meetings and later written up for publication. The arrangement of the first session of this character was given over to Professor Camp, Vice-President for Statistical and Actuarial Methods and Technique, and the Teaching of Statistics. Professor Camp arranged two extremely interesting sessions for the Atlantic City meetings, one on the chi-square test and another on fiducial probability. For details of these sessions the program of the Ninety-ninth Annual Meeting* may be consulted.

It might be mentioned that the Institute of Mathematical Statistics is holding a session in Indianapolis on applications of mathematical statistics to industry and engineering. There will also be invited addresses "On the independence of certain estimates of variance," "The theory of general means," and "The future of the Institute in relation to mathematical statistics," as well as a joint session with the American Mathematical Society for the presentation of research papers on probability and allied topics. These sessions and the sessions of the Association on mathematical statistics have been scheduled at times which do not conflict, so that those desiring to do so may attend both.

* This JOURNAL, pp. 179–180.

It has been suggested that in view of the new direction that the activities of the Committee have taken, its name be changed to the Committee on Reviews and Monographs in Mathematical Statistics, or some similar appropriate title.

PAUL R. RIDER, *Chairman*
BURTON H. CAMP
CECIL C. CRAIG
WALTER A. SHEWHART
SAMUEL S. WILKS

Report of the Representative on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

In response to many requests for assistance in writing experimentally definite design and inspection requirements on quality of manufactured product, the Committee has given special emphasis to the development of an operationally verifiable technique of specifying requirements as to accuracy and precision. Members of the Committee have also cooperated during the past year with three societies in arranging programs dealing with the applications of statistics in engineering; have refereed several papers on applied statistics; assisted in the preparation of handbook material; answered many inquiries coming directly from those applying statistics in industry; sat in by invitation at the meetings of certain engineering committees engaged in establishing economic tolerance limits; and continued to cooperate with standardizing groups both here and abroad in the consideration of problems involving the use of statistical methods.

The Institute of Mathematical Statistics has become a joint sponsor and has appointed Professors Paul R. Rider of Washington University and S. S. Wilks of Princeton University as representatives. The American Society for Testing Materials has appointed as a second representative Mr. A. G. Ashcroft, Product Engineer, Alexander Smith and Sons Carpet Company.

A meeting of the Committee was held at Indianapolis on December 30th to discuss plans for the ensuing year.

W. A. SHEWHART

Report of the Representative on the Board of Directors of the National Bureau of Economic Research

In December, 1937, *National Income and Capital Formation, 1919–1935, A Preliminary Report* by Simon Kuznets was published. The measures of national income and capital formation presented in this volume resulted from three studies that have been carried on at the National Bureau: *National Income and Capital Formation* by Dr. Kuznets and *Capital Consumption* by Solomon Fabricant. The study of capital formation was under-

taken at the request of the Committee on Banking and Credit of the Social Science Research Council.

The measures of national income contained in the volume constitute a complete revision of the estimates for 1919–28 by W. I. King and their continuation through 1935. The measures of commodity flow and capital formation constitute a revision and amplification of preliminary estimates of somewhat narrower scope released in Gross Capital Formation, 1919–1933 (*Bulletin 52*, National Bureau of Economic Research, November 15, 1934).

This volume is to be followed early in 1938 by the final report on *Commodity Flow and Capital Formation*, Volume I, which is now in press.

Also in December the first volume of the *Studies in Income and Wealth* by the Conference on Research in National Income and Wealth was released by the National Bureau for the Conference. This volume contains eight papers presented and discussed under the auspices of the Conference at the meetings of the American Economic and Statistical Associations in 1936 and at the second annual meeting of the Conference, January, 1937.

Four *Bulletins* (Numbers 65, 66, 67 and 68) were published, September to December, 1937: Non-Farm Residential Construction, 1920–1936, by David L. Wickens and Ray R. Foster; National Income, 1919–1935, by Simon Kuznets; Technical Progress and Agricultural Depression, by Eugen Altschul and Frederick Strauss; and Union Membership in Great Britain and the United States, by Leo Wolman.

Upon the recommendation of the Universities-National Bureau Committee, an Exploratory Committee on Research in Fiscal Policy was organized to consider the desirability and practicability of a study of fiscal policy. The Committee is now drafting its recommendations. Plans for the inauguration of the program of financial research were completed during the year and steps are now being taken to begin two studies: (1) consumer credit and installment financing; and (2) changes in the capital requirements of banks, the future of commercial loans, and the demand for short term capital loans.

The National Bureau's annual report will be published following the Annual Meeting of the Board of Directors on February 7, 1938.

WINFIELD W. RIEFLER

Report of the Representative on the National Conference on Nomenclature of Disease

Beginning with March 1, 1937, the financial support necessary to carry on the work of the National Conference which, essentially, is to perfect the *Standard Nomenclature* and to keep it abreast of progress in medical knowledge, has not been available. Accordingly, the Executive Committee proposed to the American Medical Association that it take over the *Standard Classified Nomenclature of Disease*. The Board of Trustees of the American

Medical Association has voted to do this, and all the records, copyrights, books on hand, and other materials have been duly transferred to the American Medical Association.

At a final meeting of the Executive Committee of the National Conference on Nomenclature of Disease, November 4, 1937, it was decided to discontinue the Committee but to maintain the National Conference itself. This action was taken in order that the National Conference might be in a position to give its assistance and advice to the American Medical Association in the event that that body should ask it.

GEORGE H. VAN BUREN

Report of the Representative on the Sectional Committee on Standards for Graphic Presentation

The Sectional Committee on Standards for Graphic Presentation, sponsored by the American Society of Mechanical Engineers, has continued its activities during the year largely through subcommittees assigned to specific projects. The Chairman is Willard T. Chevalier, Vice-President, McGraw-Hill Book Company, Inc.

The Subcommittee on Engineering and Scientific Graphs, Walter A. Shewhart, Chairman, is continuing its efforts through a sub-group which is developing a brochure on "Engineering and Scientific Graphs for Publication."

The Subcommittee on Preferred Practice in Graphic Presentation, A. H. Richardson, Chairman, is revising its report on Time-Series Charts which was issued in tentative form by the American Society of Mechanical Engineers in April 1936. It is expected that this manual will be issued under the title, "Time-Series Charts—A Manual of Preferred Practice," when approved by the Sectional Committee, the A.S.M.E., and the American Standards Association.

A. H. RICHARDSON

Report of the Representative on the Council of the American Association for the Advancement of Science

At the meeting of the American Association for the Advancement of Science in Indianapolis, Professor Wesley C. Mitchell was elected President. His election is a very distinguished honor and the choice of a social scientist to be president of the largest organization of scientists in America is a noteworthy recognition of the growing importance of social science. Mr. H. R. Tolley, Administrator of the Agricultural Adjustment Administration, was elected a Vice-President and Chairman of Section K. It is of interest that the meetings were grouped about the central theme "Science and Society." The American Association for the Advancement of Science is seeking to widen its influence among the younger scientists and the social scientists.

WILLIAM F. OGBURN

NOTES

MR. W. S. GOSSET

Statisticians all over the world will deplore the news of the death of Mr. W. S. Gosset, on 16th October 1937 in his 61st year of age. It is true that the name of Gosset will not be recognized by many of them. As far as I know, during his 30 years of scientific activity he used it only once, when reading a paper before the Industrial and Agricultural Research Section of the Royal Statistical Society, in Spring 1936. Usually he signed his works with the pseudonym "Student" and by this name he is known all over the world. In fact, it is hardly possible to find a single volume of any journal dealing with mathematical statistics or its applications, and published within the last five or perhaps ten years, in which "Student's" work is not quoted or at least, used. To see this let us remember that the test of significance of a mean or of a regression coefficient usually requires the use of "Student's" distribution. This popularity is the more remarkable, as the number of papers published by "Student" is relatively small: I know of about 20 and probably it does not exceed 25.

Mr. Gosset started his education in Winchester and graduated in mathematics and chemistry at Oxford. Then he obtained an appointment at the Dublin Brewery of Messrs. Arthur Guinness, Son and Co. He worked in this firm till the end and died as the Chief Brewer.

Mr. Gosset's contact with, and his interest in, mathematical statistics was due to a lucky idea of one of his superiors at the Brewery. He happened to read a book on probability and, as Mr. Gosset explained it once himself, thought that "there may be some money in it." He called on Gosset and suggested that he should go to London and study the probability theory at the University College under Karl Pearson, whose fame as a leader in this field was already well established. Accordingly, Mr. Gosset came to the Biometric Laboratory and spent some time there in 1906–1907. This was the beginning of a lasting and fruitful contact. In later years, working permanently in Dublin,* he would occasionally come to London and visit the Statistical Department where he had many friends. Many of Mr. Gosset's papers, including his first of 1907 and his last, which is now at the press, are published in *Biometrika*.

In order to appreciate fully the importance of "Student's" scientific work, we must keep in mind that the most difficult part in research is to notice the existence of important problems to be solved and to produce some sort of solution, however inadequate it may be. This requires a special equipment of the worker: a very broad outlook and what may be called scientific initiative in the best sense of the word. Frequently the results of such pioneer work are not perfect and the first solutions of the problems, or even

* A short time before his death Mr. Gosset's residence was transferred to London.

their statements, fail to be entirely satisfactory. Still, they mark the real progress of the science. Their formal defects, if any, are of minor importance. Other workers after being shown the problem, will work on it, correcting, developing, expanding.

"Student" possessed to a marked degree the gifts that are necessary for pioneer work and used them most successfully. At the time he started his scientific work, the theory of statistics was concerned mainly, if not entirely, with problems of large samples, such as occur in certain biological and social studies. Foremost among "Student's" achievements is that he stated and solved a number of fresh statistical problems connected with the work of big industrial organizations, such as the Guinness Brewery. They included: applied bacteriology, laboratory analyses, agricultural experimentation, time series analysis, etc., etc., and, above all, the problem of small samples which is involved in many of these fields of research. It is true that some statistical work in the directions mentioned already had been done but it was exceedingly rare and then no special methods seem to have been devised for the purpose. The methods which were applied, were borrowed from other fields and uncritically transplanted. Thus the respective workers had opportunities to see problems of mathematical statistics which were of considerable importance, but failed to see them. The most important thing that they overlooked and that "Student" noticed, was that they had to deal with small samples and that these require special methods, special distributions and tables. There was some theory concerning small samples published before, but the relevant publications were known only to a few mathematicians who had no knowledge of applicational problems. Those on the other hand who had to deal with applications, did not know the available theory. "Student" was the man to formulate the applicational problems and to start anew or, partly, rediscover the necessary theory. Let us give a few examples.

"Student" started with the problems of applied bacteriology and rediscovered and introduced for their study the Poisson Law of frequency. This formed his first paper.* A lively discussion followed with many participants including Karl Pearson. Now the number of papers written on the subject is very considerable and the applications of the Poisson Law to certain bacteriological problems well established.

"Student's" next and certainly the most important paper was "On the Probable Error of a Mean,"† containing the famous "Student's" distribution and a small preliminary table of its integral. Previous workers on applicational problems frequently had occasion to calculate the familiar ratio $z=\bar{x}/s$, where both the numerator and the denominator are based on a small number of observations. To test the significance of the mean $\bar{x}$, it was customary to refer $z\sqrt{n-1}$ to the normal scale of frequency and nobody

* "Student": "On the Error of Counting with a Haemacytometer," *Biometrika*, Vol. V (1907), pp 351–364.

† *Biometrika*, Vol. VI, (1908), pp. 1–24.

seemed to suspect that the variability of the denominator s might invalidate the test. The excellent scientific initiative of "Student," perhaps combined with, or influenced by, that of Karl Pearson, induced him to study directly the distribution of z itself. In doing so he rediscovered the distribution of s, previously found by Helmert, but then entirely forgotten.

It would be impossible to exaggerate the importance of "Student's" z test. The number of papers written by various writers on this subject is simply enormous and a textbook on statistical methods is unthinkable without a considerable section concerning that test. Apart from its own value as a statistical tool, its discovery played an important rôle as a stimulant to the study of small samples and of the general problem of testing statistical hypotheses.

As the third example of "Student's" pioneer work I shall quote his first paper on agricultural experimentation,* which should be rightly considered as a starting point of an extensive theory which is now well known. There were several further papers by "Student" on the subject, including his last, now in print in *Biometrika*, which deals with the difficult problem of the advantages and disadvantages of systematically balanced layouts.

Finally an important paper† on "Errors of Routine Analyses" should be mentioned. It is difficult for me to judge how far it influenced the procedure followed in industrial works where a permanent control of quality is kept. I know, however, how important it is for us theoretical people, who are in constant danger of overlooking technical difficulties and of oversimplifying practical problems. If our teaching in the universities is now sometimes impractical, it was certainly more so before we read this paper of "Student" and heard of the unexpected tricks that might be produced by the repeated analyses, even if they are carried out in seemingly identical conditions.

Whatever "Student" wrote was simple, interesting, important and very well written. I shall always remember his advice how to write papers so as to make them easier to understand: "First say what you are going to say. Then say it. Finally say that you have said it. And then the reader will have no chance of overlooking what you wanted to say." This is a good advice and "Student" was careful to follow it strictly. Unfortunately he was wrong in his last conclusion: the recent literature shows that, even with such precautions as in "Student's" papers, their essential parts may be overlooked or misinterpreted.

With the death of Mr. Gosset theoretical statisticians have lost a teacher of practical problems. Persons interested in various applications of statistics have lost the man who most successfully taught them the theory. Many people, practically all who had the privilege of meeting Mr. Gosset personally, have lost a most cordial, sincere and gentle friend.

J. NEYMAN

* "Student": "On Testing Varieties of Cereals," *Biometrika*, Vol. XV (1923), pp. 271–293.

† *Biometrika*, Vol. XIX (1927), pp. 151–176.

INTERNATIONAL STATISTICAL INSTITUTE

Professor Robert E. Chaddock and Dr. Halbert L. Dunn are the American members elected to the International Statistical Institute on the most recent ballot. The other American and Canadian members of the Institute are: Honorary—Herbert C. Hoover, Walter F. Willcox; Regular—William L. Austin, R. H. Coats, S. A. Cudmore, Edmund E. Day, Davis R. Dewey, E. Dana Durand, Richard T. Ely, Haven Emerson, Roland P. Falkner, Irving Fisher, Worthington C. Ford, Joseph A. Hill, M. C. MacLean, H. Marshall, Wesley C. Mitchell, Charles P. Neill, William F. Ogburn, Raymond Pearl, Stuart A. Rice, Joseph Schumpeter, Cary Snyder, William M. Steuart, and Edwin B. Wilson.

INSTITUTE OF MATHEMATICAL STATISTICS

The 1937 meeting of the Institute of Mathematical Statistics was held in Indianapolis, Indiana, on December 29–30. The Institute held three sessions, one devoted to voluntary research papers, another to invited addresses on theory, and the third to invited papers on applications of statistics to industry and engineering.

The Institute luncheon was held at the Marott Hotel, at which Professor H. L. Rietz spoke on "The Future of the Institute in Relation to Mathematical Statistics."

At the business meeting the following officers were elected for 1938: President, B. H. Camp; Vice-Presidents, P. R. Rider, and S. S. Wilks; Secretary-Treasurer, A. T. Craig.

The Institute voted to hold its 1938 meeting with the American Statistical Association.

POLISH STATISTICAL SOCIETY

The Society has been established as an organization uniting all persons engaged in the various domains and divisions of science, who are seriously interested in the application of statistical methods. The object of the Society is to develop the science of statistics both in the theoretical and in the practical field. Within the near future the Society will publish a scientific periodical as its organ.

The offices of the Society are situated temporarily in the premises of the Chief Bureau of Statistics of the Republic of Poland, viz., at 32, Al. Jerozolimskie, Warsaw.

The following persons were elected to hold the executive posts within the Society: Mr. Edward Szturm de Sztrem, President; Professor Jan Czekanowski, Vice-President; members of the Executive Committee—the President and the Vice-President as above; Secretary, Mr. Jan Derengowski; Treasurer, Dr. Jan Wiśniewski; Mr. Rajmund Buławski, Mr. Zbigniew Łomnicki, and Mr. Edward Strzelecki.

PROGRESS OF WORK IN THE CENSUS BUREAU

THE CENSUS BILL

At this writing (February 1) the bill prepared in the Bureau of the Census to provide for "the Sixteenth and Subsequent Decennial Censuses and for other purposes" has not yet reached Congress. It has been approved by the Secretary of Commerce, and is being considered and reviewed by the Budget Committee and by the Central Statistical Board.

Under the bill as drafted by the Census Bureau, the decennial census hereafter will regularly cover population, employment and unemployment, housing, agriculture, irrigation, drainage, and horticulture. All these subjects were covered by the census of 1930, except housing.

The bill provides for a quinquennial census of industry and business to cover the year 1943 and every fifth year thereafter. The subject of manufactures will be included in that census and the present biennial census of manufactures will be discontinued. There will, however, be a limited annual census of industry and business for each of the years intervening between the quinquennial censuses. The bill provides also for a census of population to be taken in the year 1945 and every ten years thereafter in connection with the census of agriculture which is provided for in the present law and perpetuated in this bill. That will give us a quinquennial census of population as well as one of agriculture.

The bill gives the Director the authority to compile and publish estimates of population in the interval between census enumerations.

In addition to the quinquennial census there will be a census of industry and business covering the year 1939. This, of course, will be taken in 1940 and the work of collecting and tabulating the data and preparing and publishing the reports will have to be carried on simultaneously with the work on the decennial census. The Sixteenth Decennial Census, therefore, will practically, though not nominally, cover everything included in the Fifteenth Census and more; but that will not be true of decennial censuses after the Sixteenth.

The bill makes provision for the collection of statistical data—monthly, quarterly, semi-annually, or annually—supplemental to the censuses specifically authorized by law, and covering such basic data as production, sales, shipments, orders and stocks of commodities, and the activity and capacity of machinery or plants. The Bureau has long been collecting statistics of this character but on a rather limited scale. The authority conferred by this section of the bill is hedged about with certain qualifications. The Director is authorized to collect such statistics "when directed by the Secretary and within appropriations available therefor;" and such collections may be made "at public expense only in event that the Secretary after due investigation shall find the inquiry necessary to serve a broad public need of an urgent nature."

The Director of the Census is further authorized to make limited annual surveys of agriculture, the scope, content, and procedure of such surveys to

be determined by agreement between the Secretary of Commerce and the Secretary of Argiculture, and the latter to be responsible for the field canvass, while the Director is to tabulate the data and publish the report thereon. Those who know about the so-called Buchanan bill will realize that these are the provisions of that bill, which has now been taken over into the Census bill almost verbatim.

It is to be anticipated that the bill in its progress through the Budget Committee and the Central Statistical Board before it reaches Congress will undergo some changes, the nature and extent of which it is not possible to predict at this time.

THE UNEMPLOYMENT REGISTRATION

The unemployment data recently secured through the Postal Service by a process of voluntary registration are now being tabulated. This work is in charge of a special organization created for the purpose and having no connection with the Bureau of the Census. The Bureau, however, is furnishing the electrical machinery for the tabulation, and has loaned some of its best qualified statisticians and experts to advise and assist in tabulating and publishing the returns.

Following the first announcements of the total registration given to the press early in January, a preliminary report has been published giving the registration by counties and for cities of over 10,000, and distinguishing three classes, namely (1) unemployed and wanting work, (2) employed in W.P.A., N.Y.A., C.C.C., or other emergency work, and (3) partly employed and wanting more work. The card punching is nearly completed and the machine runs, of which there will be four, are under way. The cards sorted by class and sex will be run for age, race, occupational groups, industry, number of dependents, and number of other workers in the family. It is expected that the work will be completed by June 1.

MUNICIPAL REFERENCE SERVICE

During the past year the Bureau has established a Municipal Reference Service in the Division of Financial Statistics of States and Cities. The basis of this is a collection of municipal data from cities with a population exceeding 50,000 now being assembled as a sub-project of the Federal Writer's Project fostered by the Works Progress Administration. The collection consists of data officially compiled as a matter of public record and available in printed, mimeographed, typed, or other form (including newspaper clippings). It covers all the various functions and activities of municipal governments.

The material is being collected in duplicate, one set being permanently retained in the Bureau for reference and use by Government Officials and others in Washington, while the other will be available for loan to city officials and research workers elsewhere.

A CARD INDEX FOR THE CENSUS OF 1920

In previous issues of this JOURNAL references have been made to the card index of the 1900 population census which was being prepared as a W.P.A. project in St Louis. This has now been completed and has proved to be of great assistance to the Census Bureau in meeting the increasing demand for certificates of age required in applications for old-age pensions and in other connections. Formerly the cost of looking up a name in the original census schedules was about $3.00 but with the card index a name may be located and the information transcribed at a cost of only a few cents. Arrangements have now been made to have a similar index covering the census of 1920. This will be prepared as a W.P.A. project in New York City. Approximately 106,000,000 people were enumerated in the census of 1920; and it has been estimated that it will require the services of about 3,600 persons working for 18 months to complete the index. The clerical force employed on this task will be taken from the local relief rolls, the Bureau of the Census supplying only the supervisory force.

J. A. H.

A CORRECTION

Mr. Benjamin Greenstein calls to my attention the fact that an error in sign has inadvertently crept into Table IB of my article, "On the Simultaneous Determination of the Elementary Regressions and Their Standard Errors in Subsets of Variables" (September, 1937). On page 522, the section beginning "From line 6" should read:

$$P_{22} = \frac{-\Delta_{2344}}{\Delta_{3344}} \cdot P_{23} - \frac{\Delta_{2334}}{\Delta_{3344}} \cdot P_{24} + \frac{1}{\Delta_{3344}}$$

$$P_{12} = \frac{-\Delta_{2344}}{\Delta_{3344}} \cdot P_{13} - \frac{\Delta_{2334}}{\Delta_{3344}} \cdot P_{14} - \frac{r_{12}}{\Delta_{3344}}$$

JACOB L. MOSAK

STATISTICAL NEWS AND NOTES

Dominion Bureau of Statistics, Canada

Census of 1931. With the exception of the special monographs, Volume I which has just been published marks the final stage in the publication of the Census data. This publication is a compendium of the other volumes and also summarizes the important statistical information of previous censuses. The population of Canada is traced back to 1608. Appended to the Volume is a list of available sources of data from all past censuses classified as follows: (1) those published in volumes; (2) those published in bulletins; (3) those in folios in the stacks of the Bureau of Statistics; and (4) those in the stacks of the Dominion Archives.

Seven out of twelve of the monographs have been completed as regards population and are now in process of printing. The subjects covered are: (1) Literacy and School Attendance; (2) Origins and Nativity; (3) Unemployment; (4) Age Distribution; (5) Families and Households; (6) Juvenile Dependents; and (7) Rural and Urban. The remaining five are in various stages of completion.

Quinquennial Census of the Prairie Provinces, 1936. Since the last report was submitted the following bulletins have been issued: October 7th—"Occupations and Industries of Gainfully Occupied"; October 15th—"Report on Agriculture for the Province of Alberta"; October 18th—"Unemployment among Wage-Earners"; November 1st—"Unemployment and Earnings among Wage-Earners on and not on Relief in Cities of 30,000 Population and Over"; and December 1st—"Earnings and Employment among Wage-Earners."

Vital Statistics. The first routine compilation of deaths by the place of residence of the deceased was made for the year 1935 and the report covering this compilation is now complete. The data supplements the tables of deaths by occurrence which appear in the Annual Report of Vital Statistics for the year 1935; they do not replace these tables.

Up to and including the year 1934, the regular compilations of the Vital Statistics of Canada made in the Dominion Bureau of Statistics were tabulated according to the locality in which the birth or death took place, though special tables showed the number of births of non-resident mothers and the number of deaths of non-residents in cities and towns of 5,000 population and over. A special tabulation was made of births and deaths according to place of residence for the years 1930–32, which allowed the computation of standardized rates on the population results of the Census of 1931.

For 1936 both births and deaths have been coded in such a way as to permit of the issue of tables according to place of residence.

Agriculture. The Agricultural Branch of the Dominion Bureau of Statistics has under consideration the use of meteorological data of supplementary crop-correspondent information in the preparation of crop estimates and

condition reports. To date a report on the influence of rainfall and temperature on wheat yields in Saskatchewan has been prepared; it is planned to extend this to the provinces of Manitoba and Alberta.

The Agricultural Branch released a new bulletin "Receipts from the Sale of Principal Farm Products" in January 1938. This publication which gives details of income from farm marketings in the Prairie Provinces will be issued monthly. As work in the other provinces progresses similar information will be made available for them.

Education. Two excerpts from the briefs submitted to the Rowell Commission by the Education Branch of the Dominion Bureau of Statistics and by the Canadian Teachers' Federation, respectively, are of interest:

(1) "Educators throughout Canada are agreed as to the outstanding service of this office (the Education Branch of the Dominion Bureau of Statistics) since its inception. It has to a remarkable degree become the National Bookkeeper of Canadian Education, collecting and analyzing comparative facts dealing with formal and informal education in the Provinces, the cities, the towns, and rural areas of the Dominion . . . this office corresponds in a small way to the United States Office of Education. . . . The services rendered could be greatly extended with advantage to education in Canada by means of publications, conferences called by the director, and by the use of the radio."

(2) "Among its (The Dominion Government's) most important educational activities is the provision of the Education Branch of the Dominion Bureau of Statistics. This Branch is responsible for the publication of the Annual Survey in Canada . . . also a series of bulletins on educational topics. So valuable is the work of this office and so plain has it become that its activities are peculiarly adapted to the Government, that almost all educationists are of the opinion that its scope should be greatly extended."

Central Electric Stations. A statistical survey of the use of electric power in manufacturing and mining industries in 1935 has recently been issued. It is shown that 78 per cent of power equipment capacity in manufacturing industries and 76 per cent in mining industries was made of electric motors operated largely by power purchased from central electric stations. The increase in power equipment since 1923 has been considerably greater than the increase in the number of employees, though the business revival of 1934 and 1935 resulted in a greater increase in employees for those years than of power equipment but still over the long-term period the gap was wide and indications are that it will continue to widen.

International Conference on Population at Paris, 1937. Canada was represented at this conference by M. C. MacLean, Chief of the Census of Analysis Branch of the Dominion Bureau of Statistics. A paper prepared by Mr. MacLean and Mr. A. J. Pelletier, Chief of Demography, dealt with the Canadian economic family (or household). The conclusion drawn from the paper was that the size of the Canadian household has remained fairly constant since the time of the first French settlers.

Central Statistical Board

Standard Industrial Classification. In the past six months important progress has been made toward the establishment of a standard industrial classification for the compilation of statistics. It is hoped that this classification will be generally adopted, thus providing comparability of business data collected by various agencies and increasing their usefulness, thereby making it possible to avoid what now appears to be irreconcilable and conflicting results. In June 1936 the Social Security Board adopted, with slight modification, a two-digit classification of manufacturing and non-manufacturing industrial groups. This classification was developed under the auspices of the Division of Placement and Unemployment Insurance of the Department of Labor and Industry of the State of New York by Mr. Kolesnikoff of the Central Statistical Board's staff, Mr. Solomon Kuznets (then of the Bureau of Labor Statistics), and Mr. Leonard Adams of the New York State Division of Placement and Unemployment Insurance. Later, upon the recommendation of the Social Security Board, other States having unemployment compensation laws adopted the same classification.

The Central Statistical Board has taken the initiative, through an interagency committee which it established at the request of the Social Security Board, in proceeding toward the perfection of the two-digit classification and toward the preparation of a detailed subclassification which will be presented in a standard four-digit industrial classification manual. As an aid in the classification of individual enterprises and establishments, the Committee is preparing a list of goods and services produced in the United States, cross-indexed by producing industries.

It is intended that the *Standard Industrial Classification Manual* will consist of three sections, namely, Manufacturing Industries, Non-Manufacturing Industries, and a Cross-Index of Products and Services.

The classification of manufacturing industries (Section No. 1) has been completed and suggestions and comments have been obtained from trade associations and representatives of industry. A number of revisions are contemplated in the classification now being used by the Division of Manufactures in the Bureau of the Census in an effort to improve existing classifications.

Preparation of the section covering non-manufacturing industries is now in progress and comments and suggestions from representatives of industry and trade associations will be sought in the near future. Although some classification systems have been developed for the non-manufacturing field, this field still remains relatively undeveloped. Thus far work on the standard classification has been confined to establishments; the problem of multiple establishments will be considered later.

Preparation of a cross-index of products and services (Section No. 3) will be undertaken in the near future and it is hoped that the *Standard Industrial Classification Manual* will be ready for distribution early in June.

The following agencies are represented on the Committee on Industrial

Classification: Central Statistical Board, Social Security Board, Treasury Department, Bureau of the Census, Securities and Exchange Commission, Bureau of Labor Statistics, U. S. Employment Service, and the Division of Placement and Unemployment Insurance, Department of Labor and Industry of the State of New York.

Board of Governors of the Federal Reserve System

The *Federal Reserve Bulletin* for November 1937 included a tabular analysis of changes in the number of national and State banks during 1921–1936, by States. This analysis covered the factors of increase such as primary organizations, reopenings, etc., and the factors of decrease such as suspensions, conversions, consolidations, mergers, etc. An analysis of bank suspensions supplementing the detailed tabulations of suspensions included in the September 1937 issue of the *Bulletin* appeared in the *Bulletin* for December 1937. An article on group banking in the United States as of December 31, 1936, and another on trends in bank earnings were included in the February 1938 issue of the *Bulletin*. The study of bank earnings is based primarily on national bank data, although attention was given to such other material as is available.

Division of Finance and Research, Farm Credit Administration

The Economics Subdivision in cooperation with the Farm Credit Administration of Springfield and the Maine Agricultural Experiment Station has been engaged in a study of farm credit problems in Aroostook County, Maine. Data have been obtained on the amount of farm mortgage indebtedness and changes in indebtedness in recent years. Sources of short term credit, purpose and costs of short term credit and experience of creditors in financing potato production were important aspects of the study. Records were obtained from individual potato growers and an analysis made of their credit problems.

Studies of land classification and loan experience have been carried on in certain counties of New York, Iowa, North Dakota, Montana, and Maine, in each case in cooperation with the Farm Credit administration of the district and in some cases also in cooperation with agricultural experiment stations. The results of the analysis of loan experience in different land classes indicate that first mortgage farm loan experience was much more favorable on the more productive than on the less productive land.

A study of credit unions is in progress in which the operating experience of nineteen urban and four rural credit unions is being analyzed in detail. The purpose of this study is to develop information on the services, loan policies, administrative practices, and financial problems of credit unions which would be of value to credit unions and supervisory authorities.

Securities and Exchange Commission

The Research Division has initiated a program under which our statistical information about trading in securities on exchanges and in the over-the-

counter market will be considerably enlarged. It is expected that in the course of time part of the statistical information to be collected by the Commission will be made available to the public in one form or another.

The statistics on underwriting activities and related matters were released on November 2 and 29, 1937, in Statistical Series Releases Nos. 30 and 41, respectively. These releases marked the beginning of the more or less regular publication of such statistics which had been accumulated for some time within the Commission. All material has been limited to issues registered under the Securities Act of 1933, and generally only to such of these as amounted to $1,000,000 or more.

Averages of such underwriting data as gross spreads (commission and discount) to underwriters, concessions to dealers and characteristics of bonds, detailed tabulations of such information by issues, underwriting participations, analyses of the expenses of registration and flotation of securities, and data on securities offered to stockholders by means of rights have been released. The first three items appear to be susceptible to regular publication and it is the intention to release additional data quarterly. Additional statistics on the other items will be released at irregular intervals as the material becomes available; the data published thus far do not cover the period beyond June 30, 1937.

The statistical work in connection with the Commission's study of investment trusts and investment companies has been completed. The submission to Congress of the pertinent sections of the Commission's report is now expected in the Spring.

Federal Trade Commission

On November 16, 1937, the President, in a letter to the Commission, directed it to make an immediate investigation into monopolistic practices and other unwholesome methods of competition to which, it was alleged, a reported marked increase in the cost of living in 1937 was in part attributable. The President directed that report be made as early as practicable. On November 20 the Commission enacted a resolution to undertake this investigation.

It will be noted that the President's letter does not, as has been popularly supposed, direct a general inquiry into the cost of living or into causes generally of any increases thereof, which may have occurred, but only into certain practices which, under the anti-trust acts, are already under the Commission's watchful eye and to which increases in the cost of living may in part be attributable. No report on the progress the Commission has made in the investigation has yet been made.

The Commission's inquiry on farm implements and machinery is under way. Public Resolution No. 130, under which this investigation is being made, directs the Commission to investigate corporations "engaged in the manufacture, sale or distribution of agricultural implements and machinery of whatever kind and description . . . . " Among other things, the Commission is required to ascertain costs, selling prices, profits, and distribution

methods of both manufacturers and distributors. Conditions of competition, tendencies to monopoly, and apparent violations of the anti-trust laws are to be ascertained and reported.

Report forms have been sent to some 250 manufacturers, more than 6,000 independent retail dealers, 250 retail dealers affiliated with manufacturers and almost 16,000 representative farmers and farm leaders.

An engineering study is being made to cover manufacturing methods, changes in designs, improvements in the quality of machines, and other engineering problems.

Bureau of Foreign and Domestic Commerce

Monthly estimates of income payments in the United States have been prepared by the National Income Section of the Division of Economic Research, Bureau of Foreign and Domestic Commerce, and figures for each month from January 1929 to December 1937, inclusive, appeared in the February 1938 issue of the *Survey of Current Business*. The estimates were described in an article entitled "Monthly Estimates of Income Payments in the United States, 1929-37," by Robert R. Nathan and Frederick M. Cone.

Figures are presented separately for three major type-of-payment classifications, namely, compensation of employees, aggregate dividends, and interest, and total entrepreneurial income which includes entrepreneurial withdrawals and net rents and royalties. Also labor income is shown separately for four industrial groups, including manufacturing, mining and construction; transportation and public utilities; trade and finance; and Government, service and other industries. Seasonally adjusted indexes have been prepared of total income payment, total compensation of employees, the later class being broken down into the major industrial divisions. The article discusses the significance of the results and briefly outlines the sources and methods of estimation. The Department plans to publish a bulletin within the next few months outlining in detail the derivation of the estimates for each type of payment and each industry.

The final report on "Consumer Use of Selected Goods and Services, by Income Classes, by Cities" on the fifty cities studied has now been completed and published by the Bureau. The results of these studies reveal characteristic differences in living standards among the various income classes. They not only present a vast array of factual data designed for the use of business men in better covering and better serving the consumer but also include much data of potential interest to consumer groups and individuals. For example, it is noted that families having incomes below $2,000 constitute the owners of not less than 60 per cent of all automobiles and 40 per cent of all mechanical refrigerators, as reported by a representative sample of each city's whole family population.

Plans are being made for the 1938 edition of the *Consumer Market Data Handbook*, designed as a nation-wide survey of the market for consumer goods. The latest available figures will be shown on a comparable county basis for all counties. This *Handbook*, when completed, should be of great

value to advertisers, marketing executives, and statisticians interested in this type of basic data.

The Bureau through the Market Data Section has undertaken the collection and analysis of data on dollar sales, volume of accounts receivable outstanding, and the volume of collections on accounts receivable for both manufacturers and wholesalers. In addition there will be shown each month data on the cost of stocks held by wholesalers. It is believed that the additional data on stocks and credit conditions will serve to give a more complete picture of current domestic production and distribution. The first release of this new series was issued in December.

The Market Data Section has also started its Retail Credit Survey for 1937 which will include for the first time an analysis of installment sales by kinds of business made during the same year. In view of the serious thought given to this subject by economists, business men, and Government officials, this report should be very timely. The results of this study should cast much light on a subject where basic statistical data are meager.

The Survey, which covers fourteen lines of retail trade in eighty-eight cities well distributed throughout the country, will point out significant credit facts regarding each kind of business studied, cost and credit sales, collection percentages and bad-debt losses. In addition, it will include many charts and tables which should be of great value to students of credit selling. Publication of this volume is expected to take place sometime about the middle of this year.

Total retail and wholesale trade estimates for 1937 were released during January. These estimates are by kinds of business and describe the activities that took place in these fields of distribution during the past year.

The Division of Foreign Trade Statistics will release shortly data on foreign trade statistics for 1936, as well as statistics of foreign commerce and navigation for the same year.

The Bureau of Foreign and Domestic Commerce has recently released their revised and enlarged edition of the check sheets for the introduction of new industrial products which first appeared in June, 1935. This revised volume includes a preface on the place of marketing research in present day industrial markets which discusses the need of a marketing research department by manufacturers and an analysis of causes why such departments have failed in many firms in the past. There is also included a seven page bibliography of Government sources of industrial market research material, as well as two check sheets, one being devoted to direct marketing problems, and one concerning the origination and production of a new industrial product.

Marketing men engaged in foreign trade and teachers of this subject will be interested in the forthcoming volume on export and import practices which will be available early in 1938. This publication discusses step by step the export and import practices in the United States today. The first part of the volume is devoted to export practices and shows why and how the market abroad for any products should be analyzed, both as to the possibilities

for its sale and the existing agencies of distribution. The technique of export selling and the handling of competition in foreign markets, trade restrictions abroad, packing, documentation, transportation, methods of protecting patent and trade marks from infringement and financing of the export shipment, are also discussed and explained. The second part is devoted to import practices and deals with methods of analyzing home markets; the accepted agencies used in purchasing abroad; the importance of credit position; methods of purchasing various types of imported commodities; United States Customs procedure and formalities; and financing of imports. This volume contains much additional information which will be of value to both importers and exporters. A liberal use of forms illustrates the text, and a very complete appendix, as well as a glossary of commercial abbreviations are also presented.

Another volume of interest to marketing men is the recent Bureau publication on "Advertising in Brazil." In this volume is presented a detailed, up-to-date analysis of this country as a market for imported merchandise. The text and tables contained in this volume are well written and give the reader a comprehensive picture of this market.

The Economic Research Division of the Bureau will release shortly its publication on preliminary data on Construction Activity in the United States from 1915 to 1936. This investigation is primarily a compilation of statistical data showing the volume of construction activity in the United States over the period indicated above. Such data are shown by types of uses or function, such as residential, water supply, and highway construction; and by types of ownership such as public utilities, Federal, state, and local government activity. This forthcoming report will also include some statistics for early years and a brief analytical discussion of the fluctuations in construction activity. Another item of important interest included in this study will be an index of total construction activity form 1900 to date. A discussion of trends and fluctuations of construction and comparisons made with other lines of economic activities is also presented. This study also shows the development of logical classifications of construction activity, a summary of the statistics, and a brief discussion of the characteristics of the industry. Detailed explanations of the methods which have been used in arriving at the estimates are given in the several chapters of part 2.

The article in the December issue, of the *Survey of Current Business*, "Survey of Family Income," is based on preliminary data released by the Bureau of Labor Statistics and the Bureau of Home Economics. This article deals with the incomes of our native-white families and shows how they vary from one community of the country to another. Of the 152,000 families on which preliminary data have been released, the proportion which have been on relief at some time during the schedule year varied considerably from city to city and village to village. Forty-four per cent of the non-relief families surveyed owned their own homes with home ownership being relatively greater among the families reporting higher incomes. The highest percentage of home ownership was reported by families surveyed in villages.

United States Tariff Commission

The Works Progress Administration Statistical Project at Richmond, Virginia, conducted under the supervision of the United States Tariff Commission was described in the June 1936 number of this JOURNAL. Most of the work undertaken in this project has been designed to provide more detailed information and more nearly comparable data for a number of years regarding United States imports than is available in *Foreign Commerce and Navigation of the United States* published by the Department of Commerce. The original program has been extended through December of this year, and all of the work planned at present will be completed by that time. As a result of this project, there are now available for distribution the following tabulations:

United States imports for consumption by countries during 1929. This tabulation shows imports for consumption into the United States by countries for approximately 4,500 commodity classes in numerical sequence within the commodity groups, according to the statistical arrangement used by the Department of Commerce. This arrangement is similar to the volumes furnishing 1931–35 and 1936 import statistics discussed in this JOURNAL (June 1936).

Computed duties and equivalent ad valorem rates on imports into the United States from principal countries during 1929, 1931 and 1935. This report shows the average rates of duty on free and dutiable imports from 34 selected countries, the data arranged by commodity groups. In addition, detailed statistics are furnished for principal commodities imported from 11 of these countries.

Schedule A—Statistical classification of imports to the United States arranged by tariff schedules and tariff paragraphs of the act of 1930, effective January 1, 1937. This tabulation presents a rearrangement by tariff paragraphs of Schedule A Statistical Classification of Imports into the United States. The basic material from which this compilation was made was taken from the statistical classification effective January 1, 1937, issued by the Bureau of Foreign and Domestic Commerce, which is arranged by the commodity groups used by the Department of Commerce in the publication of its import statistics. Authorized changes through April 9, 1937, have been incorporated. This compilation also includes pertinent information and detailed instructions for use in interpreting coded statistical material prepared by the Department of Commerce. A supplement to this volume is being prepared, listing the items which have been specified in the reciprocal trade agreements now in effect.

Monthly imports for consumption into the United States by economic groups, agricultural and non-agricultural, during 1932 and 1933. This report furnishes data regarding free and dutiable imports for 48 selected countries comparable to the summary figures published in *Foreign Commerce and Navigation of the United States* for 1935 (Table 24).

Reciprocal trade bibliography. This compilation affords current data by abstracting references from the congressional records and adding other new entries since the publication of *The Tariff*, a bibliography issued during 1934.

Commodity packaging and density-stowage study. This study represents an analysis of the packaging of approximately 2,000 commodities, and furnishes data showing the density and stowage factors of the commodities named in the Tariff Act of 1930, which are important in domestic and international trade. This material has been arranged in convenient form for ready use in matters of transportation, and will be issued as a handbook in the near future.

Reports on chemical nitrogen, sodium sulphate or salt cake, flat glass, and wood pulp and pulpwood have recently been issued by the United States Tariff Commission. These reports contain comprehensive analyses of industry and trade in the commodities with which they deal, and all are of interest in connection with current developments in international trade. The reports are based in part on official statistics, but also in part upon original data collected by the Commission.

Bureau of Labor Statistics, U. S. Department of Labor

Surveys of wages, hours, and working conditions are under way in a number of industries. The bituminous coal study will appear shortly in bulletin form and the survey of the cotton goods industry is nearing completion. Field work has been completed for the radio and electrical manufacturing and appliance industries. Surveys have recently been undertaken for the meat packing plants; explosives, ammunition, and fireworks; and furniture manufacturing, to cover household furniture, wood and metal office furniture, and public seating. Some 80,000 firms in both manufacturing and nonmanufacturing industries have been questioned with regard to their vacation policy, and the replies to this inquiry are in process of being analyzed.

The Bureau's annual survey of industrial injuries in 30 manufacturing industries for 1936 as compared with 1935 has been completed. The detailed analysis of industrial injuries which is made each year for the iron and steel industry is also ready for distribution. A special study has been made of causes of injuries in the fertilizer industry.

An article has been published on the amount of labor created by expenditures on PWA construction projects during the four years from the beginning of the program in July 1933 through June 1937. The study treats of both the amount of labor at the site and the estimated indirect labor created.

The surveys of labor productivity made by the Bureau of Labor Statistics in cooperation with the National Research Project of the WPA for cigars, cotton garments, and leather have been completed. In the field of labor legislation two new bulletins have been published—"Occupational Disease Legislation in the United States, 1937" and "Laws Relating to Employment Agencies in the United States." The latter study covers legislation in effect in 1936 with an appendix for 1937 and deals with both public and private agencies, including immigrant agencies.

Information on union wage rates and hours, as of May 15, 1937, has appeared in recent issues of the *Monthly Labor Review* for the building trades,

the printing trades, street railways, bakeries, and truck driving. The annual report on strikes in 1937 is in preparation.

From January 10 to 28, a conference of the Bureau's retail price field agents was held in New York. The conference was devoted to general problems in field work, and this year special attention was given to the pricing of textiles and clothing. Members of the Bureau staff, representatives of the textile industry, and authorities on marketing and pricing problems addressed the meetings, and considerable time was given to round table discussion.

There is available a new series of indexes of net monthly bills for electricity, from March 1923 to December 1937 for each of the 51 cities from which electricity prices are secured. The indexes are for 3 of the 4 services for which prices are regularly published quarterly—25 and 40 kilowatt-hours for lighting and small appliances and 100 kilowatt-hours covering also the use of a refrigerator.

The Bureau is releasing each quarter mimeographed tables showing retail prices of coal and other fuels in the 51 cities included in the retail price series. These data are given for kinds, grades, and sizes of the fuels which are most important for household heating in each city, and are presented in greater detail than those which have appeared in published reports.

The Bureau is engaged in reviewing its rental sample in each of the 32 cities included in its cost of living indexes in an attempt to make the sample representative as to types of dwellings, rents paid, geographical distribution, etc. Indexes by types of dwellings from 1935 to date (1935 average = 100), based on rentals paid for unfurnished, occupied dwelling units, have been released for 13 cities in which a revised sample has been obtained.

With the calculation of the weekly index number of wholesale prices for January 1938, the Bureau introduced the revised method of computation which was introduced in the calculation of the monthly indexes in July 1937. Discussion of the revised method of calculation appeared in the December 1937 issue of this JOURNAL. Copies of a reprint of the article are available from the Bureau of Labor Statistics.

During the past two years the Wholesale Price Division of the Bureau has been engaged in a program for the improvement and betterment of its wholesale price reporting service. Surveys have been completed for the improvement of the wholesale price reports for the cement, soap, and farm machinery industries. The revised prices and index numbers for these industries were incorporated in the calculation of the Bureau's general index number beginning with the computation of the index for January 1938. The revised data for other industries and items being surveyed will be incorporated in the computations at regular intervals. Among these which are scheduled for completion early in 1938 are lumber and millwork, brick, shoes and other leather products, automobile tires and other rubber products, chemicals, insulation and wall board, tile, fiber board, and small implements and tools.

Early in 1938 the Bureau plans to revise the report "Specifications of Commodities Entering into the Composite Weighted Index" issued in Sep-

tember 1935. In collaboration with the Research and Statistics Division of the Office of the Secretary of the Treasury Department, there was prepared late in 1935 an index of 189 most sensitive commodities and 190 least sensitive commodities. A copy of the list of commodities entering each group and the indexes from January 1928 forward together with a chart showing the movement of the indexes are available from the Bureau.

The records of more than 20,000 registrants at selected Public Employment Offices who had migrated across State lines have been made available to the Bureau of Labor Statistics by the United States Employment Service. Partial tabulations of these data were included in the preliminary report of the Secretary of Labor to the Senate on the subject of migration of workers. These data have been punched on Hollerith cards and a full analysis will be made by the Bureau as funds are made available.

Social Security Board

The end of 1937 marked the completion of the first full year of operation of the old-age insurance program. Statistics of the operations indicate the extent to which the program has been established and gotten under way. At the end of December 1937, the number of applications for employee account numbers had reached the total of 36,688,339. Total pay-roll taxes collected under Title VIII from employers and employees, as of the same date, amounted to $506,180,184 according to Bureau of Internal Revenue figures. Wage reports covering the first half of 1937 are now being posted to individual employee wage records in Baltimore, and reports for the second half of 1937 are being received currently from employers. The new regulations providing for employers' quarterly reports of taxes and individual employee earnings on a single form will go into effect in 1938. A cumulative total of 69,771 claims for lump-sum benefits had been received by December 31, of which 50.6 per cent were claims for death payments and the remainder for lump-sum benefits at age 65. As of the same date, 53,237 claims had been certified for payment in a total amount of $1,277,516.

There has been created in the Bureau of Old-Age Insurance of the Social Security Board a new Analysis Division under the direction of Merrill G. Murray, formerly Associate Director of the Bureau of Unemployment Compensation. This Division will conduct administrative research and studies in the field of old-age insurance and perform the actuarial operations necessary to the work of this Bureau. In addition to these functions, it has been charged with the responsibility of preparing the statistics emanating from the old-age insurance program. The Analysis Division, in collaboration with the Division of Old-Age Benefits Research in the Bureau of Research and Statistics, is continuing analysis of the 11-million sample of applications for account numbers under the old-age insurance program to which reference was made in the September issue of this JOURNAL.

Bureau of Research and Statistics, Division of Public Assistance Research. Publication of *Relief in Urban Areas*, which was suspended with the issue covering the month of May 1937 to permit a thorough reexamination of the

reports included in the series, was resumed in January. Reports for the months of June through September, as well as a revised trend including earnings under the Civil Works program and earnings of persons certified as in need of relief employed on WPA projects, appeared in this issue.

General Relief Statistics: At the request of the Senate Committee to Investigate Unemployment and Relief, the Division, on January 5, requested telegraphic reports covering the month of December from selected cities on the number of cases receiving general relief, the number of cases added during the month, and the number of general relief cases with "employable" persons. The same data were requested from state agencies for entire states in order to corroborate city reports. State agencies have been requested to continue to submit telegraphic reports on these items by the seventh of each month for selected urban areas in addition to the regular monthly reports. Hitherto, state totals for general relief have been published for states submitting substantially complete reports; estimates for all states from which inadequate and incomplete reports are currently received will be published in the February issue of *Public Assistance: Monthly Statistics for the United States.*

Relief in Urban Areas: Following completion of the revision of figures included in the trend of urban relief in the United States, figures from each city are being rechecked to discover errors which seriously affect the trend for an individual area but do not appreciably affect the United States total. This is being undertaken because of the numerous requests for tabulations for particular areas.

Old-Age Assistance Program: A special study of the old-age assistance program in urban areas and in rural areas in November 1937, based on reports received for the urban and rural series, has been initiated. The number of recipients and the amount of obligations incurred for payments will be related to the population. Average payments per recipient in rural and in urban areas also will be compared.

Public Assistance 1933–37: Tables showing the distribution by states of obligations incurred for payments to recipients of old-age assistance, aid to dependent children, and aid to the blind, by six-month periods, are in progress; figures for the United States were published in January. Data on old-age assistance and aid to the blind programs for the years prior to 1936 are based on reports published by the U. S. Department of Labor. All other data were collected by the Division from state and local agencies.

Bureau of Research and Statistics, Division of Unemployment Compensation Research. The final forms and instructions on the reporting of benefit statistics were issued to the states in January. The forms provided for the reporting of claims received, disposed of, appealed, and payable; the number and amount of benefit payments for total and partial unemployment, classified according to the amount of the payment; the promptness of payment; the placement of claimants; and the number of claims received by local employment offices. Other forms noted in previous accounts of activities are being held in abeyance, pending clarification of benefit paying procedures in the states. First reports from 22 states and the District of Columbia,

in which benefits were payable in January, will cover operations for that month.

The Division has been developing techniques for the conduct of studies of seasonal unemployment, partial unemployment and part-time work, and factors affecting qualifications for benefits. A memorandum has been prepared on merit rating in unemployment compensation.

Division of Research, Statistics and Records, Works Progress Administration

Works Program Statistics. Effective with the completion of reports for November 1937, the function of compiling statistics on the operations of the Works Progress Administration was transferred from the Area Statistical Offices to the several State Works Progress Administrations. The need for reducing operating costs to a minimum made it necessary to curtail the scope of statistical reporting. At the same time, it was believed that many of the past obstacles in the way of an adequate state reporting system have been gradually eliminated, thereby making it appear practicable to place the responsibility for a minimum number of essential statistical reports in the states. The transfer thus results in further organizational simplification.

Under the new procedure, as in the past, the WPA reporting system will be under the general supervision of the Division of Research, Statistics and Records in Washington. Reports will be compiled in the states from the operating documents and records prepared and maintained by the various operating divisions. Wherever possible, the mass tabulation work will also be carried out in the operating divisions. A State Statistician, whose appointment is approved by the Washington Office, is responsible in each state for the technical accuracy and submission of all statistical reports and will act in liaison capacity between the state and the WPA Division of Research, Statistics and Records in Washington on matters pertaining to reporting. A Regional Statistician, representing the Division in the field, also has been appointed to each of the five WPA Regional Offices to work with the State Statisticians and the heads of the various state operating divisions on technical procedures for regular reports and special tabulations supplementing the regular reports which may be required by the Washington or the Regional Offices.

The principal reports now required or planned under the new system are a weekly count of the total number of persons under active assignment to work projects in each state; a quarterly report on employment by county of project operation for the last week in each quarter; a similar quarterly report of employment by type of project; a monthly report on sponsors' expenditures for WPA projects for labor and non-labor costs; a monthly report on hours worked and earnings on WPA work projects for each state and for selected urban areas; a monthly report on sponsors' expenditures for NYA projects for labor and non-labor costs; a monthly report on employment, hours worked, and earnings on the NYA Student Aid program by types of

student aid; a monthly report on employment, hours worked, and earnings on NYA work projects; a quarterly report on encumbrances and expenditures for work projects by county of project operation, sources of funds and objects of expenditure; and a quarterly report on encumbrances and expenditures by types of project, sources of funds, and objects of expenditure.

A state reporting system was used under the CWA and FERA programs which preceded the Federal Works Program. The Area Statistical Offices, as established in July 1935 when the Works Program was being put into operation, had three major purposes: (1) the elimination of certain difficulties in statistical reporting that had characterized the CWA and FERA reports which were prepared in state offices; (2) the collection of more extensive and more detailed information than was found practicable under a state reporting system; and (3) the insurance of coverage of the activities of Federal agencies other than WPA, operating with funds appropriated by the Emergency Relief Appropriation Act of 1935 and subsequent acts.

At the present time the operating procedures and basic records in the State Works Progress Administrations are fairly well standardized. Hence, greater comparability is found from state to state than characterized the previous ERA and CWA programs. Likewise, the records are maintained on a sufficiently current basis to permit the prompt submission of regular reports. These factors, together with the general experience acquired through more than two years of operation should contribute to the success of the new system and assure a definite advance over the state reporting system of the earlier relief programs.

A comprehensive inventory of physical accomplishments on WPA and NYA projects through October 1, 1937, has been completed. A preliminary summary now available provides national totals. These will subsequently be analyzed by states to show in detail for each state what has been done through WPA and NYA project operations.

Arrangements have been made to conduct several research studies involving analyses of records maintained in the Area Statistical Offices prior to their discontinuance. These include a tabulation of the total number of different persons employed from the beginning of operation through November 1937, the occupations at which WPA workers were assigned to projects, the duration of the employment of workers under WPA, and other aspects of WPA operations that are not available from regular employment and project records. In addition, a study of the NYA students and their family backgrounds is being made from the applications of youths seeking to obtain benefits under the Student Aid program. This analysis covers such items as the occupation of parents, the economic status of the applicant's family, and the age, school grade, sex, and race of the applicant.

Relief Statistics. A summary of general relief statistics for the period January 1936 through March 1937 has recently been issued. The beginning of this period roughly coincides with the termination of Federal Emergency Relief Administration grants to the states, and the return of general relief

responsibilities to state and local governments. Since March 1937, the Social Security Board has been responsible for the collection and publication of general relief statistics.

This summary presents, in addition to revised totals reported by the various states, data for individual cities which have not been published heretofore. The figures are described and explained in accompanying text.

Since the publication of the last issue of this JOURNAL, detailed tabulations of Emergency Work Relief Program costs, by types of project and sources of funds was released for six states and a preliminary summary for the continental United States was completed. Any of these publications may be obtained from the Works Progress Administration upon request.

Division of Social Research, Works Progress Administration

Separations Study. A preliminary report has recently been issued on a November survey of workers separated from WPA employment within the period April through July 1937, in five urban and four rural areas. Data were presented on the sources and amounts of income secured after separation and on the relative economic welfare of the separated cases before and after leaving the Works Program. Also, the post-separation adjustments of these cases were contrasted with those of cases covered in a similar separations survey made a year earlier.

Labor Shortage Studies. The final results of the check-up studies made in the early fall of 1937 on reported industrial and cotton harvesting labor shortages are now available. The industrial studies, which covered 24 large cities, in addition to the urban areas generally in a few other states, revealed that the labor shortage problem was less serious in 1937 than in 1936 and that Works Program employment played little or no part in producing what shortages existed. The cotton harvesting studies, conducted in Texas and several southeastern cotton states, showed that shortages of pickers were localized and temporary and that the supply of cotton pickers was, with minor exceptions, entirely adequate.

Migrant Families. A study of migrant families, who follow casual occupations, has been begun in Arizona and California. Earnings, hours worked, and other conditions of work of this type of family are being covered.

Transient Studies. The yearly check-up on the condition of transients throughout the country has been completed in five cities. The survey indicates that the problem of transiency is at least as severe this winter as it was last winter, and is perhaps more severe. The cities surveyed thus far are Chicago, Jacksonville, Los Angles, Memphis, and New Orleans.

Digests of State and Local WPA Studies. For some months there have been in preparation digests of state and local research projects carried on with WPA funds. The work of digesting these reports is rapidly approaching completion and it is planned to publish the results in one or more volumes in the next few months. Publication of the digests will make available to students

the major findings of the great number of WPA local research projects conducted during the last few years.

As a separate project the series of state bulletins published under the WPA cooperative plan for rural research is being digested. This series now includes more than 100 reports. The digests are now nearly completed and the material is being assembled for a summary report on the plan.

Relief in Urban and Rural-Town Areas, 1932–1936. This study presents a combination of the data from the urban and rural relief reporting series, estimated up to United States totals. The estimates cover aid to the aged, to dependent children, and to the blind, worked out in cooperation with the Division of Public Assistance Statistics of the Social Security Board; general and veterans' assistance, including local poor relief and hospitalization; Resettlement emergency grants; and private assistance. Wage assistance data are now being revised to include the latest information available.

Survey of Public Assistance Extended to Households in Drought Areas. A field study of relief statistics from 64 sample counties in the Great Plains region is in process of tabulation. The data give complete coverage of relief households for the six-month period, July through December 1936, and include a record of relief household income by months and by agency as well as the usual sociological data. Hand tabulations have been made to show various types of relief duplication.

Study of Rural Problem and Non-Problem Areas. The indexes of social and economic conditions described in this JOURNAL'S December notes have been gathered for each county. Both rural-farm and rural-nonfarm areas of relative homogeneity with respect to problems relating to relief and security programs will be established. Actual demarcation of rural farm areas is now under way.

Project Procedures. The Division of Social Research is working cooperatively with other divisions within WPA and with other Federal agencies in preparation of standardized procedures for WPA projects in the field of planning and housing. A comprehensive survey procedure covering real estate activities, originally prepared by the Federal Housing Administration, has been reworked to make the procedures more adaptable to WPA project requirements. Summaries are being made of real property inventory data for all cities which were covered in the Department of Commerce survey of 1934, and in all subsequent surveys. A procedure is also being developed for follow-up sample studies (of occupancy and vacancy) in those cities in which real property inventories have been taken.

Other procedures of this type being developed include property identification maps, use of city directories or similar local records to show the relation of occupancy and vacancy to type of dwelling unit, indexing of mortgages and deeds, and real property valuation and assessment.

Releases of the WPA Division of Social Research. Rural Youth on Relief, Research Monograph XI, by Bruce L. Melvin, is an analysis of the characteristics of rural youth receiving assistance under the general relief program

and a survey of the Federal agencies created to aid underprivileged youth. The monograph analyzes particularly the situation of youth in rural relief families in October 1935 before the Works Progress Administration with its National Youth Administration became really effective.

Trends in Relief Expenditures, 1910–1935, by Anne E. Geddes, is a study planned to give perspective to recent relief developments by relating them to long-time trends. In the report are collected, for the first time, the scattered and fragmentary data on outdoor relief expenditures prior to the recent depression. Taken together, they offer convincing evidence of a strong underlying upward trend in expenditures for at least two decades before the precipitous rise beginning in 1930, and a gradual shifting of the relief burden from private to public resources long before the period of Federal participation in unemployment relief.

United States Employment Service

At the time this note is written the Division of Standards and Research of the Employment Service is preparing material for a new publication covering operations of the Employment Service through December and comparing information secured through an inventory of all registered job-seekers made in November with available results of the National Unemployment Census. This study will carry forward results of earlier studies which have been published by the Employment Service from time to time, the most recent publication being *Survey of Employment Service Information*, 1937.

In addition to giving summary data concerning the volume and character of Employment Service operations throughout the country, the information secured through the Employment Service provides a large-scale sample indicator of the unemployed group. Unlike most other indicators, Employment Service reports contain detailed information concerning such items as age, industrial background, occupational classification, sex, color, education, etc., and gives geographic breakdowns to units as fine as individual counties. Reports are based upon classifications made by trained interviewers at the time of the applicant's original registration and maintained on a current basis through successive reinterviews. Studies[1] conducted by the Employment Service have shown a correspondence between movements of Employment Service series and the movements of various business and unemployment series.

In the past detailed inventory surveys of all active job-seekers have been made at periodic intervals. Work is in progress to determine a sampling method whereby it will be possible to secure a reflection of the characteristics of the registered job-seekers on a national scale at more frequent intervals without the necessity for taking a complete survey in every locality. The characteristics which are being considered in developing sampling bases include age, color, race, sex, and occupational classification of gainful workers and their distribution among industrial groups, as well as their

[1] See "Recent Trends in Unemployment," *Monthly Labor Review*, Bureau of Labor Statistics, United States Department of Labor, November, 1937, pp. 1093–1109.

geographic distribution. The technique being used is one based on the assumptions ordinarily used in correlation analysis. Experience has shown that distributions obtained through the application of this sampling method in general have possessed a high degree of reliability as compared with the complete surveys.

The Worker Analysis Section of the Employment Service is continuing the development of techniques for the selection of inexperienced applicants likely to be successful in particular occupations. Such selective devices for the occupations of coding and card punch operating have been developed. A preliminary procedure for the classification of individuals as department store salespersons has been standardized. Several follow-up studies involving the use of this procedure are now in progress. Work has been started on the standardization of selection and classification techniques for comptometer operating, adding machine operating, calculating machine operating, business machine operating, hand transcribing, and power sewing machine operating.

Office of Education

The bound volume of the *Biennial Survey of Education, 1932–34*, is now on the shelves of the libraries. Previously only the separate "Advance pages" have been available. Bound volumes are not available to the public, but the separate chapters may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

All the statistical chapters except one for Volume II of the *Biennial Survey of Education, 1934–36*, are finished and are or will be soon in process of printing. Certain preliminary data from "Statistics of State School Systems" and "Statistics of City School Systems" have been released and are available from the Office of Education.

The National Archives

The Third Annual Report of the Archivist of the United States was published in January. Included in this report is a 58 page "Guide to the Material in The National Archives." Copies of the report may be had from the Administrative Secretary of the National Archives, Washington, D.C., as long as the supply lasts.

Graduate School of the U. S. Department of Agriculture

Under the title "Lectures and Conferences on Mathematical Statistics" the Graduate School has published the lectures delivered by Dr. Jerzy Neyman and the proceedings of the conferences in which he participated during his visit to Washington in April 1937. The publication has been carefully revised and supplemented by Dr. Neyman with the editorial assistance of Dr. W. Edwards Deming. It includes lectures on the theory of probability, experimentation, and testing statistical hypotheses. The conferences covered a wide range of statistical problems in agricultural and economic research. The book consists of 160 pages mimeographed with a paper binding and

may be secured from the Graduate School of the Department of Agriculture, Washington, D. C., at $1.25 a copy.

United States Public Health Service

Results of the National Health Survey conducted in 84 cities and 23 rural counties by the United States Public Health Service during 1935–1936, with the aid of Works Progress Administration grants are being issued in two series of bulletins.

An introductory bulletin describes in detail the purpose, scope, and method of the study. The data pertaining to health are presented in the *Sickness and Medical Care Series* reports. They cover prevalence and incidence of acute and chronic disabling illness and the receipt of medical care in relation to factors such as income, relief status, employment status, occupation; age, sex and color; and the amount of time lost from usual activities. A separate sequence of bulletins, the *Population Series*, give population and economic data which are of interest apart from the material dealing with sickness and medical care.

Members of the Association who wish to receive these bulletins should make their requests promptly for there is only a small supply for distribution. Communications requesting bulletins and specifiying the series desired should be addressed to the National Health Survey, United States Public Health Service, Washington, D. C.

New York State Department of Social Welfare

On July 14 the Bureau of Research and Statistics of the New York State Department of Social Welfare released the first copy of its new bulletin, "Social Statistics," covering July, August, and September, 1937. Although this issue is concerned chiefly with statistics of public assistance, the title of the periodical promises a broadening scope in the future. Besides presenting and interpreting current statistics, each number will contain a featured article of special interest. The next issue, dealing with the last quarter of 1937, will be off the press about March 1st. Thereafter, until it becomes feasible to publish on a monthly basis, the quarterly numbers will be supplemented by interim releases in mimeographed form.

Brookings Institution

Two Institute of Economics books were published during February.

The Income Structure in the United States, by Dr. Maurice Leven, attempts to clarify the meaning of national income and the distribution of income. It analyzes the factors determining income and in calling attention to the causes of inequalities in income and of poverty it offers a basis for an intelligent approach to the application of remedies.

America's Stake in International Investments, by Dr. Cleona Lewis, tells the story of capital migration to and from the United States from the Revolutionary War period to the present time, gives a comparison of foreign debts and investments at eight significant dates (together with a presenta-

tion and discussion of the basic data employed), and considers the issues involved for the future.

A study to be called "Government in Relation to Industry" is in progress at the Institution under the direction of Dr. Leverett S. Lyon. This study is comprehensive in its scope, including both those phases of economic life which are organized by private enterprise and those which government operates directly. The study, which was begun in the autumn, will be concluded sometime in 1939.

National Bureau of Economic Research

Frederick R. Macaulay's eagerly awaited volume, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, was published in February. At first glance, this book, with its eighteenth century title, might seem to be of interest to the purest of the pure theorists alone. But as one begins to read even the highly theoretical first chapter one soon begins to realize that this is the type of theory that is "theory" not because it is impractical but because it really explains. Wesley Clair Mitchell, to whom the book is appropriately dedicated, has written a Preface.

The two volumes by Simon Kuznets, mentioned in the December issue of this JOURNAL, have also been published: *National Income and Capital Formation, 1919–1935* and *Commodity Flow and Capital Formation, 1919–1935*. The former summarizes three National Bureau studies: national income, capital formation, and capital consumption. The latter presents complete and detailed estimates of the volume of capital formation and of the flow of commodities to consumers, as well as the technique used in making the estimates. It includes exhaustive analyses of subsidiary material, e.g., data on distributive margins, inventories, and construction estimates. (The National Bureau has adopted a larger format, $8\frac{1}{4}$ by $11\frac{3}{4}$ inches, for books such as these that contain many large tables.)

The report on *Capital Consumption* by Solomon Fabricant is in the hands of the Directors of the National Bureau and, subject to their approval, will be published by early summer.

The Report of the Committee on Prices in the Bituminous Coal Industry, of which Waldo F. Fisher is Chairman, has been approved by the Directors of the National Bureau. It is one of six reports prepared for the Conference on Price Research. A few copies will be bound in paper for immediate distribution; the rest of the edition will be held until other of the reports on prices in industries are ready and then bound with them in cloth.

As at the 1936 annual meetings of the American Eocnomic and Statistical Associations, the Conference on Research in Income and Wealth, of which Simon Kuznets is Chairman, presented papers at Atlantic City at the December 1937 meetings. These, together with those presented at the annual meeting of the Conference itself, will constitute Volume II of *Studies in Income and Wealth*.

The first *Bulletin* of the 1938 series, number 69, is by W. C. Mitchell: "The Timing of Cyclical Movements in Economic Series."

National Industrial Conference Board

In accordance with its practice of studying different phases of business development, and, in particular, industrial management by means of the sampling method the Board has recently established a new series of publications entitled *Studies in Personnel Policy*. The issues in this series thus far published relate to dismissal compensations, profit-sharing and other supplementary-compensation plans covering wage earners, multiple shift operation, personnel policies affecting salesmen and curtailment, lay-off policy and security. The analysis is by number of companies and when applicable by the number of persons affected. Further studies are projected relating to managerial profit-sharing, company public relations, and employee rating systems.

Parallel in method, but in a somewhat different field, is a study of "Prevailing Practices in Inventory Valuation," now in press and to be issued shortly as the first of a series of *Studies in Administration Control*.

In the field of wages, hours, and employment in manufacturing industries, the regular monthly studies of the Board have recently been supplemented by an investigation of wage differentials. For five leading industries average earnings of all wage earners and of specific occupations are being studied in different sections of the United States. A preliminary report on all male wage earners has been issued as a supplement to the *Conference Board Service Letter* (January 1938). Preparations are being made for a comprehensive study of clerical salaries early in the spring.

The Conference Board will issue shortly a new study, by Dr. R. F. Martin, on national income covering briefly the years 1900 to 1908 and in much greater detail the years 1909 to 1936. For this later period figures will be given showing the industrial origin of realized income and within each field the different types of income. Some of the more general results of this study are being prepared for early publication in the *Conference Board Bulletin*. Other special income studies are in preparation of which the most ambitious is an investigation of income by income size groups.

Following his study of the "Economic Development of Germany under National Socialism," Mr. Vaso Trivanovitch, Chief of the Board's Department of International Affairs, has spent several months abroad gathering material for a study of the economic position of Russia, and a similar study of the economic position of Italy.

The Board will publish shortly a review of national wealth estimates, assembling the available material and discussing how they are made and what significance is to be assigned to them.

The Department of Public Finance is making a study of the taxation of business and is collecting material for the Board's annual volume on the cost of government.

Research Projects at Dun & Bradstreet, Inc.

Business Trend Survey. An inquiry known as the "Business Trend Survey" replaces the Retail Survey which has been conducted for the past four years showing operating averages for somewhat more than 100 retail trade classifications. The Retail Survey will not be undertaken this year as the four-year study revealed little shift in the annual percentages, and these were commonly in the expected direction.

Business Trend Survey figures will first be published on a summary basis, but detailed regional and trade analyses will follow within a short period thereafter. The questionnaire, which has been sent to all of the 2,100,000 names in the Dun & Bradstreet Reference Book, asks for information in four specific categories covering the three-year period of 1935, 1936, and 1937. The first question deals with annual sales volume, the second with the vital subject of inventory, the third with receivables, and the fourth with expenditures for additions and improvements. Through the last item it is hoped to learn the attitude of business men toward permanent investment under present economic conditions. Results will cover manufacturing, wholesaling and service lines, as well as retailing.

Natural Business Year Study. A series of bulletins on seasonal fluctuations and suggested fiscal closing dates for various industries and trades is being compiled at the request of the Natural Business Year Council, an organization representing accountants, credit men, and credit agencies. The study has been undertaken in the belief that dissemination among business men of a wider knowledge of the seasonal patterns of production, sales, inventories, receivables, and liabilities will be helpful to management in various ways, in addition to its specific bearing on this problem. The position of Dun & Bradstreet, Inc. is solely that of impartial fact-finding agency. Promotion of the "Natural Business Year" as a concept remains a function of the Natural Business Year Council.

Arguments offered by proponents of a "Natural Business Year" include the following:

a. That a business concern can most easily take inventory and audit books at a slack period when personnel is not rushed,

b. That accountants would be able to do better work for their clients, possibly at less cost, if books were closed on dates other than the end of the calendar year,

c. That banks, credit reporting agencies, and others concerned with granting credit can analyze the true health of a business concern more accurately and readily from a balance sheet taken when current items are not subject to rapid change.

Business Births and Deaths. For the past two years a study of the business changes in business ownership in the United States has been analyzed by a special staff of the Research and Statistical Division of Dun & Bradstreet, Inc. The Company's network of offices is continually making its contribution

to this study. At the time investigations are made, these offices make special records of all available changes, classifying them as to whether they are an individual ownership, partnership, or corporation and they are further segregated to show whether it is a new business or a succession including old ownership or a succession eliminating old ownership.

These changes are divided into five groups, manufacturers, wholesalers, retailers, construction and commercial service, and within these groups are classified similar to the major divisions used by the United States Census. This analysis was first released in the February, 1937, issue of *Dun's Review*, entitled "Business Births and Deaths." It reviewed the relative changes in enterprises by industrial divisions, also the percentage of new enterprises, and disappearances in each division for the first six months of 1936. A later record showed the type of changes occurring in each of the five major trade divisions for the similar period. This work is now nearing its completion for the year 1937, at which time a comparison will be made of business changes occurring during the past two years.

Objections come from the viewpoint of students of industry as a whole. Compilation of census and some other annual figures would become increasingly difficult because part of an industry would adopt the new fiscal year, and part would remain on a calendar year. This might be solved in some industries by united action—such as the simultaneous shift of most of the fertilizer industry to a new fiscal year under the sponsorship of the National Fertilizer Association.

Each bulletin in the series covers a single industry and comprises three sections:

a. Discussion and graph of seasonal fluctuations from various published and unpublished sources.

b. Summary of available information on fiscal closing dates used in the industry or recommended for it.

c. Recommendation of a fiscal closing date, with reasons.

The preliminary draft of each bulletin is personally checked with executives in the industry by Dun & Bradstreet Reporters.

CHAPTER ACTIVITIES

The Albany Chapter

The Chapter held a dinner meeting on December 7, 1937, with F. J. Decker, President, presiding. Twelve members and guests were present.

There was a general discussion of the possibility of forming a permanent committee on state titles for statistical work, but no action was taken.

Professor E. R. Nelson of Russell Sage College discussed the special meeting of the American Statistical Association held in Denver in June, 1937, in connection with the summer meeting of the American Association for the Advancement of Science, with particular reference to the following papers: "Residence Allocation of Births and Deaths" by Halbert L. Dunn, M.D., Bureau of the Census; "Measuring Reemployment Possibilities of Workers on Relief" by F. L. Carmichael, Works Progress Administration; and "Relation Between High Profits and High Wages" by Carl Snyder, New York City.

Mr. R. F. Bucknam, Vice-President, presided at a meeting of the Chapter on January 25. Twenty-seven guests and members were present. The Chairman announced the appointment by the President of the Chapter of a committee interested in securing a classification and salary standardization rating for statisticians employed in New York City under Civil Service on a basis in line with that of other professional groups. The committee consists of Dr. Warren W. Coxe, Chairman, Dr. Roy L. Gillett, Dr. Benjamin Malzberg, Charles C. Dubuar, and Mildred M. Lauder. This action of the President was approved, and after further discussion it was voted to appoint a second committee to investigate the possibilities of more carefully defining the *professional* status of statisticians.

Dr. J. V. De Porte, Director of the Division of Vital Statistics, New York State Department of Health, gave a very interesting talk on "The American Race in the Making" based on a paper he delivered at the International Population Congress at Paris. Using the term "race" to represent the layman's concept of certain biological and cultural differences among the peoples of Europe, he pointed out that the pattern of an American race, as a distinct type, is still in the making. The synthesis of diverse racial components is directly influenced by the differential rates of marriage, fertility, and mortality. Dr. De Porte presented these differential rates for the population of New York State. A study of the main demographic indices of the population of Upstate New York indicates a progressive levelling of the racial differences in fertility and mortality. The marriages are still largely intra-racial, but the number of interracial marriages is growing, their prevalence being directly dependent upon social propinquity and similarity of economic and cultural interests.

The Boston Chapter

A meeting of the Boston Chapter of the Association was held in the Walker Memorial Room of Walker Hall at the Massachusetts Institute of Tech-

nology on November 23, 1937. After the dinner and a short business meeting, Mr. Edmund S. Cogswell, First Deputy Commissioner, Massachusetts Department of Banking and Insurance, and Mr. Charles S. Warren, Secretary, Massachusetts Automobile Rating and Accident Prevention Bureau, addressed the meeting on the subject of "Automobile Liability Insurance."

The papers dealt with the making of compulsory automobile insurance rates in Massachusetts from a statistical standpoint. The law, which was put in force beginning with January 1, 1927, provides that the Commissioner of Insurance shall fix the rate. To assist in this work an arrangement was made with the insurance companies whereby the Massachusetts Automobile Rating and Accident Prevention Bureau was created to collect the statistics. The Commissioner is furnished each year with a record of the accidents according to each city or town in which the car causing the accident is principally garaged.

In the fixing of the rates, the Commissioner thus finds himself between the companies on the one hand, who want to break even or make a profit, and politicians and the people on the other hand, who wish to keep the rates low. The law provides that public hearings must be held in the matter of rates, and they are subject to judicial review.

In recent years the rates have applied to around 550,000 passenger cars; premiums for insurance on passenger cars of 19.7 million dollars were paid in 1936, and claims amounted to 11.8 million dollars. Claims have averaged 9.3 per 100 cars and cost of claims about $250.

The basis of the premium is the average loss cost per private passenger car. The tendency of this basic figure has been upward, the pure premium in 1927 amounting to $19.57 and in 1933 to $23.27. The highest figure was $25.50 in 1934. Figures for 1935 and 1936 were lower; in 1936, because of a dropping of guest coverage, the loss cost fell to $21.09. The latter figures are roughly comparable with those of 1932, although no accurate figure for the cost of guest coverage can be computed. This upward trend in loss costs has naturally led to some difficulty in adjusting rates as between the Commissioner and the insurance companies.

In addition to the rates, the Commissioner also determines the reserves to be set aside by the insurance companies, and differences of opinion have developed between the Commissioner and the companies on this point as well as on rates.

After the determination of the basic rate, there is an expense loading amounting to 35.5 per cent. This loading expense is divided as follows:

	Percentage
Home Office	7.5
Claim Expense	10.5
Inspection and Bureau	1.1
Taxes	2.4
Acquisition and Cost	12.0
Profit	2.0
	35.5

Loss costs vary decidedly with the geographical unit, varying from $43.85 in Chelsea to $2.74 in Tolland; one town, Mt. Washington, went through a period of five years without an accident. Rates are adjusted on the basis of these variations in cost according to geographical districts. That rates should be varied according to geographical risks is coming to be regarded as the correct principle by the Commissioner and others acquainted with the insurance situation.

Mr. Warren called particular attention to the statistical methods followed in keeping the records. There are two punch cards, one for each policy and one for all claims filed. The number of cards passing through the hands of the Rating Bureau is presently expected to reach 2,000,000 per year. On the basis of the cards, 14 memoranda are prepared, summarizing the data.

One of the chief questions under continuous consideration by the Bureau relates to establishing the geographical boundaries of the districts upon which loss-cost rates are based. The question involved is: How small a geographical unit can be used and a satisfactory premium result? The different geographical units actually used are rated on the basis of actual experience, and a "credibility" percentage is worked out to indicate the accuracy of the figures for each particular district. Thus the credibility rating of Belmont is 90 per cent; the rate is based 90 per cent on Belmont experience and 10 per cent on "territorial" experience.

Discussion after the papers was chiefly upon the subject of reserves. The adequacy of reserves is admittedly a matter of judgment, and the final results of reserves set up in any given year are not available until after some such period of five years. The variations shown between actual claims paid and reserves previously set up against them have varied from a 2.7 per cent underestimate to a 1 per cent overestimate, according to Mr. Warren. These differences he did not believe to be important; that is, the estimates of necessary reserves have, on the whole, been very close to the costs subsequently paid out of such reserves.

The Tenth Annual Meeting of the Boston Chapter was held at the Boston City Club on Friday evening, January 21, 1938. There were 44 members and guests present. At the business session the following officers were elected to serve during the ensuing year:

President, (to be elected at the next meeting)
Vice-President, Theodore H. Brown, Harvard Graduate School of Business Administration
Secretary, Roswell F. Phelps, Massachusetts Department of Labor and Industries
Treasurer, E. L. Quirin, Babson's Statistical Organization
Counsellors: Charles A. Bliss, Harvard Graduate School of Business Administration
Howard C. Baldwin, Babson's Reports, Inc.

The general subject for discussion at this meeting was "Business Forecasts for 1938." The speakers were: Dr. Hermann F. Arendtz, Economist, United

Business Service, Boston, Nicholas E. Peterson, Industrial Statistician, First National Bank, Boston, and H. Clyde Baldwin, Economist, Babson's Reports, Inc., Wellesley Hills, Mass. The three speakers were closely in accord in their belief that there would be no marked recovery in business in general during the first half of 1938, but that during the second half of the year there would be definite improvement, conditioned, however, upon such action by Congress and the National Administration as would restore confidence and justify the making of commitments by business enterprises.

Dr. Arendtz stated "that the almost complete stoppage of new ordering in the late months of 1937 would lead to a using up of inventories that would make new ordering in an increasing number of lines necessary early in the new year. There is already evidence of this. Retail trade has held up remarkably well, and the offtake of merchandise stocks has been not far from that of a year ago. But unemployment has risen ominously, and public buying power is declining. Until it rises again, no substantial business advance can get under way. Prices must come down, and wages with them before that result can be obtained. . . . Much—very much—depends on the governmental attitude, and on this point I cannot feel much optimism. We ventured the forecast that a real improvement would begin by autumn. I must admit that an important ingredient in that forecast was the hope that the Administration would see the necessity of changing its attitude toward private enterprise, capital and business profits."

Mr. Peterson called attention to the fact that labor costs rose 20 per cent in the 12-month period ending June 1937, while production decreased, that the epidemic of sit-down strikes caused industry to refuse to make long-time commitments, to expand plants or to plan far ahead. He believed that the cost of living should be reduced because there had been a 25 per cent drop in pay rolls but only a five per cent decrease in the cost of living.

Mr. Baldwin expressed the opinion that the present recession is largely an inventory problem and that with a reduction in the supply of merchandise in hand there will be a resumption of production. He discussed the prices of various classes of stocks and named several classes which he believed would justify consideration for investment purposes later in the year.

The Chicago Chapter

"The Business and Financial Outlook" was the general subject of discussion at the first meeting of the Chicago Chapter on October 27th. The topic was particularly timely because of the rapid downward movement of the market at the time. Charles A. R. Wardwell, Associate Professor of Finance and Statistics at Northwestern University and member of the Research Department of Sheridan, Farwell, and Morrison (Investment Counsel), gave an analysis of business conditions and an evaluation of the seriousness of the recession. Based on the factors which had led him to anticipate the market decline and on current conditions, Professor Wardwell stated his belief that a further decline could be expected but that it would not reach the proportions of a major depression unless some new phases should develop.

He was of the opinion that the down-swing of the business cycle would be compensated to some extent by the fact that it coincided with an upward movement of the long-term cycle.

Robert P. Vanderpoel, Financial Editor of the *Chicago Evening American*, also expressed the opinion that the conditions did not appear similar to the 1929 depression and that a revival of business was not far distant. The meeting concluded with comments by Professor Theodore O. Yntema of the University of Chicago, Mr. Harland H. Allen of Harland H. Allen Associates, and Dr. John W. Boatwright of the Standard Oil Company. There were 112 present at the meeting.

The second meeting of the chapter was devoted to the subject of "Agricultural Control." Professor Asher Hobson, Chairman of the Department of Agricultural Economics of the University of Wisconsin, spoke of the economic aspects of agricultural control. Professor Hobson said that three considerations must be kept in mind: (1) that it is a long-time program; (2) that the welfare of the farmer does not necessarily coincide with the welfare of nations; and (3) that the interests of one group of farmers may be in direct conflict with the interests of other groups. In order to have effective control, a degree of isolation from world prices is necessary.

Professor Elmer J. Working, Associate Professor of Agricultural Economics of the University of Illinois, discussed some of the basic statistical research of the control program. He stated that parity prices and parity income constitute an attempt to measure economic balance but the fact that a high level of business activity is essential to a prosperous agriculture is often overlooked. The program concluded with discussions by Professor E. A. Duddy of the University of Chicago and Mr. Nat C. Murray of Clement, Curtis and Company.

"The Housing Program and Building Industry" was the topic of the third meeting on January 18th. Dr. Coleman Woodberry, Director of the National Association of Housing Officials, in his discussion of Public Aid and Interprise in Housing, said that the Housing Program included both public assistance to builders and direct building. He discussed the various governmental agencies, their functions and accomplishments. He then raised the question as to whether private and public enterprise could be carried on successfully at the same time, stating that in his opinion they could supplement each other very advantageously.

Herbert U. Nelson, the second speaker, Executive Vice-President of the National Association of Real Estate Boards, agreed that the public agency has a definite function to perform in the housing field along with private enterprise. The question was how to work it out in the best way. The chief obstacles to private building are: (1) the uncertainty of business conditions resulting in a feeling of insecurity regarding the future; (2) high material costs; and (3) high labor costs. Concerning material costs. Mr. Nelson said the manufacturers were aware that the present distribution system was an expensive one and they were trying to find ways to make it more direct and less costly. The solutions suggested were the development of home building

companies set up with large capital, like automobile companies, so that they would have sufficient bargaining power to come to terms with both the suppliers of materials and of labor; and cooperative housing, or organization of the buyer. Mr. Nelson also gave information based on a survey just completed, of building conditions in a wide sample of urban areas. This survey indicated that the real estate market is in a healthy condition, with an undersupply of single family dwellings in 52 per cent of the communities and a prospective immediate shortage in 48 per cent more, an undersupply of apartments in 40 per cent, and capital actively seeking investment in the building field in 73 per cent of the areas reporting.

The Cincinnati Chapter

Three meetings have been held so far this winter. Dr. Paul Horst, Personnel Research Department, Procter and Gamble Company, addressed the first meeting, October 28, on the work of Professor J. B. Rhine, psychologist of Duke University, on clairvoyance. The second meeting, on November 18, was addressed by Dr. D. P. Smelser, manager of the Market Research Department of Procter and Gamble Company, on fundamental problems in Market research. Another department of the same company, the Industrial Relations Division, provided the third speaker of the season, Dr. Elmer B. Royer, who outlined a procedure for mass computation of correlation coefficients on Hollerith tabulating machines.

The Cleveland Chapter

The activities of the Chapter during the present season have been confined to meetings of the Business Statistical Section. On November 8, 1937, Mr. Vanden Bosch of the Cleveland Chamber of Commerce addressed the group on the significance of the Chamber's index of employment in 100 industrial concerns.

On December 13, Mr. Raymond T. Cragin of Cragin, Morris and Company, realtors, addressed the group concerning the future of the construction industry, particularly from the standpoint of residential building. Mr. Cragin stated that he did not think that the present level of building activity is discouraging since it compares favorably with pre-boom levels. He further stated that we cannot expect building to lead us out of a depression, since house building depends on accumulated savings and a feeling of economic security for the future. He further stated that at present the number of skilled building workers is not large enough to meet the labor requirements of a building boom.

Mr. Leigh S. Plummer, Manager of the Cleveland Bureau of the *Wall Street Journal*, gave a talk on January 18 in which he discussed inflation. He discussed the use of ratios derived from banking figures in determining strength of underlying factors affecting prices of bonds, equities, the interest rate on short term loans, and the general price level along the lines suggested in the book *Seven Kinds of Inflation* by Richard Dana Skinner.

The attendance at the four group meetings held so far this season has averaged 26 members and guests, a 15 per cent increase over the previous season.

The Connecticut Chapter

A joint meeting of the Connecticut Chapter and the Connecticut Control of the Controllers Institute of America was held on January 5. Mr. A. W. Zelomek, President and Economist of the International Statistical Bureau, Inc., and Economist of Fairchild Publications, New York City, spoke on "The Causes of the Current Decline and the Prospects for 1938." A period of discussion followed Mr. Zelomek's address.

The New York District Chapter

"The Outlook for Industry" was the topic of a meeting of the New York District Chapter on December 1, 1937. Professor Wesley C. Mitchell presided. Mr. John McInerney of Wood, Low and Company presented "The Outlook for the Railroads." The prospects for "Foreign Securities" were discussed by Albert Kimber of White, Weld and Company. Thomas S. Holden, Vice-President in charge of Statistics and Research of the F. W. Dodge Corporation, spoke on "The Outlook for Building." A very lively general discussion followed.

The Pittsburgh Chapter

A dinner meeting of the Pittsburgh Chapter was held on November 19, 1937, in conjunction with the Pittsburgh Economic Club and the Pittsburgh Personnel Association. A symposium was conducted on "What New Inventions Will Do With Us and For Us." The symposium was led by Dr. William F. Ogburn, with Dr. Robert E. Doherty, President of Carnegie Institute of Technology, presiding. The discussion, which was opened by Mr. Howard N. Eavenson, was participated in by a large number of those attending. Approximately 120 members of the three organizations attended the meeting.

A luncheon meeting of the Chapter was held on January 27. Thirty-eight members were present and participated in the discussion on "Measurements of Unemployment in Allegheny County." Dr. B. J. Hovde, Director of the Department of Public Welfare of the City of Pittsburgh, opened the discussion on the possibility of a continuous local census of the unemployed. He expressed the need for such a count and the possible utilization of existing indexes of employment and records kept by the relief agencies and the employment offices. Dr. Hovde discussed the value of the census to business organizations and to the City government. Dr. J. P. Watson of the Bureau of Business Research, University of Pittsburgh, gave a brief description of the index of employment as prepared by the Bureau of Business Research, and emphasized the limitations of this index in estimating the volume of unemployment. The final speaker, Mr. John D. Beatty, Secretary of the Pittsburgh Personnel Association, discussed the local situation with regard

to unemployment of white collar and technical workers. Mr. Beatty emphasized the need for technical education and urged the encouragement of greater use of the facilities now in existence in the community. He pointed out the scarcity of skilled craftsmen in certain types of work which have developed during the depression as, for example, the use of glass bricks in construction.

The San Francisco Chapter

The Chapter held its annual meeting on November 4, with President M. K. Bennett presiding. The following officers were elected for the ensuing fiscal year: President, Dr. Murray R. Benedict, Giannini Foundation, University of California; Vice-President, Mr. Douglas R. Fuller, North American Investment Corporation; and Secretary-Treasurer, Mr. Wm. A. Sturm, Research Department, California State Chamber of Commerce. Dr. Benedict appointed the following as members of the Executive Committee: Dr. M. K. Bennett, Food Research Institute, Stanford University, and Mr. N. M. Sherman, Division of Analysis and Research, Federal Reserve Bank of San Francisco. The Secretary-Treasurer reported that the membership of the Chapter on October 1, 1937, was 111. The Chapter held 6 meetings during the fiscal year and the average attendance was 35. There was a balance of $179.54 in the treasury at the end of the year.

Dr. Edward K. Strong, Jr., Professor of Psychology, Stanford University, spoke on "Statistical Procedure in Scoring the Vocational Interest Test." The following is a summary of the address.

The Vocational Interest Test is a blank listing 420 items selected to help determine occupational adaptability in terms of personal interests. The person who is tested checks each item in terms of three possible responses, "Like," "Dislike," and "Indifferent." The items selected are those for which different occupational groups tend to present different responses. The pattern of interests characteristic of successful members of an occupational group is revealed by this test and it is not likely that a person will be happy or successful in an occupation in which the pattern of interests is quite unlike his own pattern.

The Washington Statistical Society

A meeting of the Chapter was held on November 23, 1937, to discuss the "National Unemployment Census." The speakers were Dr. Stuart A. Rice, Chairman of the Central Statistical Board, and Dr. Calvert L. Dedrick, Technical Adviser to the Administrator of the National Unemployment Census.

NEW MEMBERS

Allen, Margaret F., Statistical Technician, School of Public Health, Harvard University, 55 Shattuck Street, Boston, Massachusetts

Alsberg, Dr. Carl L., Director of the Giannini Foundation, University of California, Berkeley, California

Anton, Leonard R., Technical Analyst, Social Security Board, 1712 G Street N.W., Washington, D. C.

Backman, Dr. Jules, In Charge of Financial Research, Dorau and Madden, Two Rector Street, New York City

Ballinger, Willis J., Economic Adviser to the Federal Trade Commission, Washington, D. C.

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REVIEWS

Government Statistics, A Report of the Committee on Government Statistics and Information Services. New York: Social Science Research Council. Bulletin 26. 1937. xiv, 174 pp. $1.00.

The widely heralded "brain trust" group was a tiny fraction of the academic procession to Washington in 1933. This document tells the story of the statistical division of the migration.

There were at least two good reasons why the Spring and Summer of 1933 were critical for Government statistics. The state of the budget had already made serious inroads into statisticians and current statistical activities, and the inevitable revolution in personnel threatened the survivors. At the same time, however, there were members of the new Cabinet who saw the situation not as a threat but as an opportunity to review and revise the statistical work of the Government.

In June, 1933, on the basis of an understanding with the secretaries of the Federal departments concerned, the American Statistical Association and the Social Science Research Council jointly organized a Committee on Government Statistics and Information Services. That those concerned with Government statistics should act cooperatively was not a new idea. Government statisticians had a common organization in the Federal Statistics Board, although it never was very effective, since it lacked authority, staff, and funds. Occasionally outsiders were brought in for consultation through such agencies as the Census Advisory Committee. What was new was the establishment in Washington of a paid staff giving full time, not in the Government but with a quasi-official status, directing itself primarily to an objective examination of statistical policies and practices. Nor was this merely a matter of coaching from the bench. Time and time again, the representatives of COGSIS actually took the ball and, although they were sometimes thrown hard for a loss, occasionally made spectacular gains.

There are certain problems which any program for Government statistics must face. These are not only matters of technical standards but of operating relationships. The Government must consider its relation to private enterprises, which are frequently both suppliers of raw material and users of finished reports. Within the Government there are dangers of competition for personnel and funds for other projects, jurisdictional disputes and jealousies, nonsympathetic supervision, ill-considered statistical planning, if any, and the like. One of the earliest recommendations of non-official COGSIS was the establishment of an official Central Statistical Board. The CSB was created by Executive Order on July 27, 1933, and given a five-year life by Congress two years later.

The Report gives the mature judgment of those who were active in the picture as to the broad pattern of policy which should be followed in developing an integrated statistical program. It is based upon the proposition that

statistical work should not be undertaken in a vacuum, by telescope, or by remote control. Except for routine tabulation and the like, which may be centralized, responsibility should be located at the functional point, which also should be the point of greatest interest. In many cases this might lead to work by private or State agencies, rather than the Federal Government. Such a decentralization, however, makes necessary procedures assuring coordination. It is proposed that this be attained by means of interdepartmental committees and the operations of the CSB. Furthermore, over the entire field, the CSB should have direct responsibility for the utility, practice, and personnel of statistical projects. The discussion is exceedingly pertinent, since much of the program is already in operation. The Report is in part a justification and in part a declaration of principles for the CSB.

This general summary gives an erroneous impression of the Report, inasmuch as it is packed with the discussion of specific problems and detailed recommendations for improvements in existing statistical work. It urges a modification of established secrecy rules. It emphasizes the waste involved in the failure of printing budgets to permit publication of completed studies. It advocates the centralization of existing consumer services. It even suggests more extensive use of the sampling technique by the Bureau of Fisheries, interestingly enough, a technique used by the constituents of that Bureau almost entirely.

The essential significance of this Report is not in its detailed recommendations but in the character of the project itself. It pictures statisticians taking no mere passive role, analyzing whatever data are available and cursing in isolation over the inadequacies of their raw material. Here is a vigorous effort to do something about it. A small group was involved in the venture—but its ultimate accomplishment depends upon a continuing concern on the part of statisticians generally.

The usual test of a business enterprise is market absorption of its product. The number of satisfied customers is indicated by its sales volume. Statistical work by Government agencies is in part for purposes of determining Government policy, but much of it must be justified chiefly on the basis of its usefulness to outsiders. These consumers do not record themselves as they would by purchasing commodities. If we desire an improved and increased Government statistical program, we must find ways to express our interest and concern. We use census data but never report their value to the Census Bureau for its support in the annual budget battle. We delight in improvements in the wholesale price indexes but fail to express our appreciation to the Bureau of Labor Statistics. We wish speedier tabulation of income tax records but never supply ammunition to the Treasury Department officials who might be sympathetic with the request. Such demonstrations by the consumers of statistics are of tremendous importance to those responsible for planning the program and the expenditures of Government agencies. That support is essential is already indicated by the misfortune of the CSB in the sharp curtailment of its budget by Congress. The valiant efforts here reported to

advance Government statistics will be successful only if statisticians themselves continue to press for improvement.

The Report is distressingly lacking at one point—it fails to give adequate recognition to the two individuals who gave leadership to COGSIS, Stuart Rice and Meredith Givens. Many others, of course, contributed in one way or another, but to these two belong the greatest part of the credit. The American Statistical Association may properly be proud of having joined with the Social Science Research Council in sponsoring this project.

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Statistical Methods Applied to Experiments in Agriculture and Biology, by George W. Snedecor. Ames, Iowa: Collegiate Press, Inc., of Iowa State College. 1937. xii, 341 pp. $3.75.

The author sets as his objective in this book the gearing together of experimental data and statistical method for the beginner. "It is the novice to whose needs this book is directed. . . . The only mathematics used . . . is arithmetic, supplemented by enough symbolism to make the exposition intelligible. . . . The easiest ideas are put first, and only one new concept is presented at a time." With simplicity of verbal exposition as a keynote, the readers are addressed directly in the informal conversational style of a laboratory discussion between an understanding teacher and his responsive student. The use of this form by Snedecor will probably impart a sense of ease and confidence to the beginner.

The instruction commences with a discussion of the sex ratio among guinea pig progeny, using the observed numbers in 12 litters yielding 18 male and 12 female descendants as basic data. Falling back on wider experience for a more dependable basis of hypothesis concerning the true sex ratio—"It is known, of course, that there are almost equal chances for any cavy to be male or female"—the notion of parameters and sampling statistics is briefly developed. The reader is then introduced on the fourth page to the measurement of discordance between observed and theoretical frequency by the χ^2 formula. A set of problems providing exercise in this computation follows immediately. The chapter then proceeds with a discussion of the sampling distribution of χ^2, briefly mentioning the histogram and frequency curve in passing to establishment of the 5 per cent point as a basis of tests of significance. Introducing percentages and the fourfold table, more drill in χ^2 follows. Five sets of problems embracing 27 exercises in all are interpolated in the text of this chapter and also some half dozen modifications of the basic formula adapted to particular situations. There is no mention of degrees of freedom so far; technical correctness of statement is sacrificed occasionally, presumably to attain brevity of consideration. Reference to the binomial theorem is preserved for the closing pages of the book.

The principle of instruction is apparently not to disturb the reader by mathematical generalization but to extend him through the analysis of selected numerical examples closely following the given types. The aim is to demonstrate a formula achieving results, thus fostering enthusiasm for it as a tool. Perhaps it is in order to restrain that enthusiasm from too ardent expansion in the reporting of research that the chapter concludes with an admonition given repeatedly in the book in diverse forms: "Don't publish computational details or discussions of statistical methods." One wonders if it is not this detailed teaching in terms of computational procedure related to specific examples, at the expense of full consideration of the principles of reasoning on which statistical tests rest, which stimulates the all too common effusion of the tyro.

This review of the first chapter must serve to indicate the general instructional procedure of the whole volume. Consideration of measured variables in sets of small frequency follows, with development of the variance formula and the t test of significance. An analysis of rectilinear regression, still with very few observations in each experiment, introduces a following chapter on the correlation coefficient. An attempted rationalization of the correlation coefficient in terms of the special case of "common elements," rather than with regard to the normal bivariate frequency distribution which alone it describes without restriction, seems to the reviewer to be misleading.

Designated as "Large Sample Theory," the eighth chapter considers for the first time computational procedure in samples large enough to warrant a frequency table. The author calls for "at least 20 classes for precise work, preferably more"(!) The chapter includes tests of normality involving Fisher's k statistics to the fourth order, and the normal curve is tabled. Considerations of theory are certainly not any more manifest in this chapter than elsewhere.

The second half of the volume is concerned chiefly with the computational procedures involved in simple analyses of variance and covariance, with a chapter devoted to multiple regression and covariance. There is a chapter on curvilinear regression that provides an exposition of procedure for fitting the polynomial up to high orders by successive stages, using Fisher's scheme of calculations—an exposition which some computers beyond the novice stage may appreciate. The closing comments of this chapter counsel against contributing to the "stupendous amount of time [which] has been wasted on ill-advised curve fitting. Only when the end in view is clear should the task be undertaken." The rather perfunctory chapter on "Binomial and Poisson Distributions" which closes the instruction might well have been omitted. Distribution problems in general are inadequately handled. The student is not encouraged to focus attention on extensive enough series for such studies.

The arrangement of the material has several distinctive features. Sections which "may be safely omitted by the beginner" or those "attempting to get only an outline of statistical methodology" are indicated in the text. These

sections embrace 72 per cent of the total pages of the book, leaving a very brief outline for the digest minded reader. For the exercise of the others, the book excels in presenting nearly 400 problems in sets at appropriate places for solution.

All subject matter sections (of which there are 6 to 17 per chapter), tables, figures, and examples are designated by chapter as well as serial number for location in cross reference. It is unfortunate that the author did not adjust these key-numbers in final proof to embrace page number and so facilitate greatly the location of needed material.

A more extensive table of 5 per cent and 1 per cent points for F is included in the text. The 528 pairings of n_1 and n_2 so provided will be appreciated by all who find the interpolation in more skeletal tables vexing. One regrets that the tables of χ^2, t, and F, to which reference is called for so freely, are not collected at a single region of ready access.

Such skepticism concerning certain values of this book as is manifest in the foregoing remarks emanates from a conviction of the reviewer that there is great danger in teaching statistical methods without building at the same time a clear understanding of the reasons validating each procedure. By all odds the most difficult field of statistical analysis, that of drawing sound conclusions from very limited information, is made to appear simple and without trace of hazard. Confidence gained through learning how to apply a formula does not convert a computer into a wise interpreter. If this missing information be supplied by a competent instructor, as surely it is in Snedecor's own classes, then the value of the book will rise to a high level. Students of agrobiology will appreciate learning statistical procedure from a painstaking and indulgent teacher, but they will not really know what they are up to until they can clearly state the reason why for each step in their own words.

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Linear Regression Analysis of Economic Time Series, by T. Koopmans. Haarlem: De Erven F. Bohn N. V. Monograph Number 20 of the Netherlands Economic Institute. 1937. xi, 150 pp. f. 2.

Dr. Koopmans' monograph is primarily a theoretical treatise on the possibility of using the method of linear regression, together with an appropriate probability theory for making significance tests in the analysis of economic time series. The author devotes the first half of the book to a statement of the problem, a discussion of mathematical tools to be used, and a detailed review of three existing regression methods, namely:

(1) R. A. Fisher's method of elementary regression, in which the main assumptions are that (i) the independent variables are regarded as fixed, that is, without error, (ii) the residual differences between the

dependent variable and a linear (regression) function of the independent variables are normally distributed. The method of estimation of parameters and sampling theory of the estimates for Fisher's system are systematically developed and discussed.

(2) R. Frisch's method of diagonal regression in which all variables are regarded as being subject to error. This method is used by Frisch in his *confluence analysis* and his main contention is that an analysis (search for linear or "nearly" linear relationships) should be made in which all variables enter into the analysis symmetrically. This method is seriously handicapped by the fact that there is not yet available an appropriate probability theory for reckoning significance of values of calculated regression coefficients and other statistical quantities. Dr. Koopmans does not attempt to supply such a probability theory.

(3) M. J. van Uven's method of weighted regression in which all variables are assumed to be normally distributed about respective means with a given matrix $\| \sigma^2 \epsilon_{ij} \|$ of variances and covariances, the means being the same for the various values of t (time) and satisfying a linear regression equation. Van Uven's procedure for determining the regression coefficients essentially consists of maximizing the probability of the observations for each value of t with respect to the means, then maximizing, with respect to the regression coefficients, the product of these maxima for the several values of t. The maximizing values of the regression coefficients are called the weighted regression coefficients. These weighted regression coefficients will involve the variances and covariances of the deviations of the variables from their means. Unless these variances and covariances are known *a priori*, the method will clearly be valueless from a practical point of view.

It is perhaps worth noting that van Uven has obtained expressions for the variances of these regression coefficients, but he is guilty of neglecting to distinguish carefully between parameters and calculable estimates of these parameters.

Van Uven's method of weighted regression furnishes the point of departure for Dr. Koopmans' own work on the linear regression problem. Koopmans assumes that corresponding to the value of each variable for each value of t there is a "true" value, so that for each value of t the true values obey the same linear regression equation. The difference between each observed value and the corresponding "true" value is assumed to be distributed in a normal multivariate distribution which is the same for all values of t, the matrix of variances and covariances being $\|\sigma^2 \epsilon_{ij}\|$. The total number of parameters introduced to characterize the hypothetical distribution of the observations is greater than the number of observations, thus creating a statistically hopeless situation. The author extricates himself, however, by assuming the ϵ_{ij} known *a priori*—thus reducing the number of unknown parameters. Under the assumption of known ϵ's the author proceeds to

estimate σ^2 and the regression coefficients and to develop an approximate method of testing the significance of values of estimated regression coefficients. When $\epsilon_{ij}=0$ for i not equal to j, the results simplify considerably.

To illustrate his method numerically, the author applies it to the world ship freight market for the period 1880–1911, in which four variables are involved, namely, freight index, transport in ton-miles, tonnage, and coal price.

Although Dr. Koopmans' method is rather general, it takes no account of linear regression relationships of "true" values of variables for different values of time; that is, no consideration is given to the important case of time-lags. Other unsolved aspects of the problem are pointed out in the author's conclusions.

The book is mathematically rather elegant and is written in excellent English. It is concisely summarized at the end in English, Dutch, French, and German. The monograph should be of interest to mathematical economists, particularly those interested in time series.

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Cost of Living in the United States, 1914-1936, by M. Ada Beney. New York: National Industrial Conference Board, Inc. 1936. N.I.C.B. Studies Number 228. ix, 99 pp. $2.50.

The Conference Board's latest volume on the cost of living in the United States presents the most complete statement which has yet appeared of the Board's methods, both past and present, in securing and averaging retail prices and in computing its cost of living index. The report has four sections, a general chapter on the problems involved in measuring changes in living costs, a detailed description of the development of the techniques used in computing the group indexes which go to make up its general index of changes in living costs, a discussion of changes in such costs since 1914, and a statistical appendix.

The first section makes a useful distinction between studies of actual family expenditures and the cost of a definite standard of living and between indexes measuring changes in living costs in given places from time to time and those measuring differences at a given time from place to place. The discussion of the use of different weighting systems is less fortunate. It is stated that the "aggregate-expenditure method" should be used with commodities for which the demand is inelastic, and the "weighted-price-relative method" with those for which the demand is elastic without making clear that the two methods are intrinsically the same except when substitutions are to be made.[1] Neither in the general discussion nor in the detailed description which

[1] F. M. Williams, M. H. Hogg, and E. Clague, "Revision of Index of Cost of Goods Purchased by Wage Earners and Lower-Salaried Workers," *Monthly Labor Review*, Vol. 41, No. 3 (Sept., 1935), pp. 826–27.

H. B. Arthur, "Weighted Aggregates and Index Numbers," this JOURNAL Vol. 32, No. 198 (June 1937), pp. 363–64.

follows is there a statement as to the specific adjustments that are made by the Board in its weights for commodities for which there is an elastic demand. So far as it is possible to judge from the data presented in Chapter II, both systems of weighting are used with commodities for which the demand is inelastic and with those for which the demand is elastic. Both the quantity and expenditure weights have undergone a certain amount of revision in the 18 years during which the index has been computed. Clothing prices are multiplied by quantity weights (the aggregate-expenditure method) according to the formula:

$$\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100.$$

The quantity weights for this index were revised in 1929, because "some of the articles formerly priced had become obsolete with changes in style, and, on the other hand, certain articles, for example, silk hosiery, had come to be generally used by families of factory wage earners—" (p.24). The sundries index, late in 1936 when this volume went to press, was computed by the weighted price-ratio method, with weights representing "the estimated expenditure for the various sundry items in 1914."

The chapter on methodology which supplies more than one quarter of the book illustrates the difficulties in the way of calculating an accurate measure of changes from time to time in the cost of a given level of living in the United States. The efforts of the Conference Board in this field must be taken as a serious attempt to follow the general movement from month to month. It is evident, however, that the Board's staff has been and is handicapped by the fact that a systematic nationwide study of the family expenditures of wage earners and clerical workers was not made between 1919 and 1934. Important changes in consumption patterns occurred in the interval, and there was great need for revision of the weights of cost of living indexes. Such revision was, however, extremely difficult because of the absence of a comprehensive survey of current purchasing habits. The revised weights for the clothing index may serve as an example. "The weights used in the present clothing budget are no longer based on expenditures for such articles in 1914, but on the quantity estimated to be purchased in one year" (p.25). No children's clothing is priced because experiments conducted in 1918 convinced the Board that the ratio of change in the prices of children's clothing followed very closely the change in prices of adults' clothing. To select quantity weights for a limited number of articles of clothing in such a way as to give representation to garments of different fabric and construction proportional to their importance in all the clothing purchased for the family is extremely difficult. When up-to-date figures on family expenditures for clothing by the group for which the index is computed become available from the new studies of the Bureau of Labor Statistics, it will be possible to calculate imputed weights representing total expenditures for groups of items which move similarly in price and thus cover the whole range of family expenditures for clothing.

The Board's staff is also handicapped by the fact that funds have not been made available for field investigators who can check and supplement the data secured by mail. The differences in the number of cities covered for the various commodity groups are probably due to the lack of such a staff. The index of food costs is taken over from the Bureau of Labor Statistics and covers 51 large cities. Rents are obtained by the Board from 173 cities. Retail prices of clothing are obtained from 93, coal prices from 95, rates for gas and electricity from 174, data on carfare costs from 289; prices on drugs, toilet articles, and candy from a chain operating in 14 cities. Admission charges to movie theaters from 83 cities are obtained in October of each year. Newspaper prices are obtained in January and June in 94 cities, and the last survey of physicians' fees was made in November, 1925.

The differences between the indexes of rental costs computed by the Conference Board and by the Bureau of Labor Statistics, which have occasioned a great deal of comment, seem to be the result in large part of differences in the method of rent collection used by the two agencies.

"Rent questionnaires are sent each month by the Conference Board to real-estate boards, chambers of commerce, real-estate agents, social agencies, and individuals who are in close touch with the rental situation of their locality. Each cooperator is requested to state as of the fifteenth of the month the approximate average monthly rent for the accommodations specified on the form. In order to assure comparability of quotations from month to month, the quotations given by each cooperator for the previous month are entered on the questionnaire before it is sent to the cooperator."

The number of reports from the different cities varies. The rent index in a given month for a given city is calculated by securing the arithmetic mean of the percentage changes from the previous month reported by each cooperator and applying this average percentage change to the index of the previous month. The index for the United States is computed by weighting the arithmetic mean of the indexes of cities within certain population groups by population weights.

The representatives of the Bureau of Labor Statistics visit real estate agencies in 32 cities quarterly and secure rents on identical dwellings for the month of the visit and for the third preceding month. No quotations are used in the comparison for vacant dwellings, for dwellings where repairs have not been kept up to date, or where remodeling has occurred within the quarterly period. When a dwelling begins to decay or changes hands in such a way that the Bureau can no longer price it, another dwelling is substituted of similar type with similar facilities. Such a system presupposes a periodic revision of the sample of dwellings priced in order to keep the sample in line with current housing conditions. Such a revision is now in progress at the Bureau of Labor Statistics. The Conference Board Index has consistently moved ahead of the Bureau of Labor Statistics' index, except for a short period in 1922-23 when the Board's index shows a decline and then a sharp rise whereas the Bureau's index shows a more regular and gradual rise.

The reporters to the Conference Board on rent are immediately in touch with rent changes; they know the prevailing price at which certain types of dwellings can be leased. There is, however, no evidence that they have any mechanism by which they may calculate the proportion of new contracts in the total rental contracts among wage earners which have been revised within the month, and the consequent influence of newly established rental rates upon average rents. The fact that the movement of the Conference Board index persistently precedes that of the Bureau of Labor Statistics leads one to question whether the Conference Board's figures may not be overinfluenced by new contracts.

Without commenting on the methods used in combining prices and subindexes from cities, it seems worth while to question the validity of using unweighted combinations of data from cities of given size in different parts of the country, the resulting combinations being further combined with weights representing the relative importance of cities of that size. In the matter of rates for gas and electricity for example, variations may be correlated more closely with region than with size of city. A new power development does not influence cities under 500,000 throughout the country, though it may profoundly affect trends in its own area. The only work which has yet been done on the problem of the relation between the general movement of prices in small cities and nearby larger ones of which I know showed a very close correlation, but the number of cities covered was small and the time span too short to make the results of the experiment conclusive. Plotting trends in the movement of the indexes computed for 32 cities by the Bureau of Labor Statistics shows a closer relationship between the indexes for a given region than between indexes for cities of given size.

It is evident that there is a good deal of work remaining to be done before measuring changes in the cost of living can be regarded as an exact science.

In view of the baffling problems connected with cost of living indexes and the very considerable practical importance of alternative methods, it is clear that every serious study should be accompanied by a full statement of the procedure actually used and of the effect on the index number. The present volume makes a valuable contribution to the understanding of the index series it describes.

FAITH M. WILLIAMS

U. S. Bureau of Labor Statistics

An Index to Business Indices, by Donald H. Davenport and Frances V. Scott. Chicago: Business Publications, Inc. 1937. viii, 187 pp. $3.00.

Users of business indices owe the authors a vote of thanks for providing a book which supplies in small compass a guide to more than 200 series. This

is not a book for the man who uses a few indices and knows each one of those intimately but rather a compilation useful primarily to those who make occasional use of business indices or those who use now one index and then another, as the needs of the moment may demand. The volume was prepared in order to enable business men and students of business and economics to ascertain quickly the nature and source of the more important business indexes which are published regularly.

The content of the book falls unto two parts, a finding index and a descriptive section. The finding index not only indicates the page upon which a given series is discussed but also states the frequency of publication. In addition the index shows, for a price series, whether prices are retail or wholesale; for a labor series, whether the data refer to employment, hours of labor, payrolls, or wages; and for a production or distribution series, whether the data refer to consumption, marketing, production, or refining. The descriptive section gives for each index the title, the complier, the frequency of publication and period covered, the publication or publications listing current data, and a brief description of the series. Under the fourth of these headings the primary sources for current data are given first, following which a number of secondary sources may also be shown. Following the list of publications showing current data there is occasionally shown a source for back data, though certain obvious sources for back data (*Survey of Current Business*, *Statistical Abstract*, etc.) are not ordinarily mentioned. The descriptions are exceptionally complete, particularly in view of the space limitations. The components of the indexes are indicated. If indexes of subgroups are available the groups are listed. For many indexes the weights given to the various component series are listed. References are occasionally given to more complete descriptions.

The reviewer is in no wise disposed to be critical of such a workmanlike job as this. Since the volume is intended primarily for business men and students of business and economics, two suggestions are, perhaps, in order. First, it would add to the usefulness of the book if not only the name, but also the location, of the compiler of each index were shown. With but limited library facilities available, users might wish to secure publications from such compilers as Electrical World, National Fertilizer Association, Aberthaw Construction Company, Edison Electric Institute, and others. Second, it is suggested that whenever a detailed description of an index is available in printed form, mention be made of the publication in which the description appears and that it made clear in the "key" or introduction that when no such reference is given there is no adequate detailed explanation available.

One feature of the book is the inclusion of some 18 pages on which the user may enter pertinent information concerning other indices. It is to be hoped that the authors will issue revisions from time to time, keeping the information in this volume up to date.

FREDERICK E. CROXTON

Columbia University

Statistics in Education and Psychology, by Elmer R. Enlow. New York: Prentice-Hall, Inc. 1937. ix, 180 pp. $2.75.

The author has arranged clearly and simply in one volume "the fundamental principles of statistical interpretation, patterns and the logic of mathematical computation, and all the tables ordinarily needed in statistical research." Each statistical measure has been covered with conciseness and under the following subheads: Definition, Interpretation and Use, Formulas, Sampling Error (Reliability), Derivation of Formulas, Mathematical Properties, and Methods of Calculation.

The book contains chapters on frequency distributions, measures of central tendency and dispersion, probability and the normal curve, partial and multiple correlation, and errors in statistical work. In the appendices are given a bibliography, a glossary of symbols, and seven tables including alienation coefficients, Spearman R converted into Pearson r, and for the unit normal curve—abscissas and other values corresponding to assigned values of p and q, and areas and ordinates corresponding to given abscissas.

Although the book is designed for class room use, we believe because of its logical concise presentation that it would serve as an excellent handbook to the occasional worker in statistics. The words "in Education and Psychology" could be omitted, as statistics is treated quite generally. The publishers have presented the text in a very attractive form. The reviewer is impressed favorably.

HENRY A. ROBINSON

Agnes Scott College

Recurring Cycles of Fashions, 1760–1937, by Agnes Brooks Young. New York and London: Harper & Brothers Publishers. 1937. xiv, 216 pp. $3.00.

In this report of a statistical study of the nature of change in apparel fashions, the author has, through applying scientific methods of analysis, measurement, and recording, reached conclusions which challenge most of the accepted theories of fashion change. Her conclusions are based on a wealth of factual data which leave no doubt as to the validity of her general conclusions. Further, Mrs. Young has developed a basic statistical method for measuring and recording fashion facts that should bring the light of reason to bear on the business of forecasting fashion. Further development of the method Mrs. Young used may bring results very different from those she now envisions, but the book will remain a major contribution to fashion merchandising.

Instead of tables of figures, the tools of this study are fashion illustrations taken from materials in the libraries of this country, of Paris, and of London, together with a few simple diagrams to show the method used in recording fashion trends. The author's original purpose was to study the relationship between fashion changes and the economic factors of depression and

prosperity. She soon became convinced from the material she examined that there was no such relation evident, but her painstaking research led her to a conclusion that is likely to have a much more vital bearing on the study of fashion, namely, that fashion changes in the 178 years included in her study have moved in a series of well-defined cycles, each of which lasted approximately thirty years. These cycles are characterized by the shape of the skirt, of which there appear to be three general types when the contour of the skirt is related to the figure underneath. The three skirt types, each of which recurs in the same order once each century and remains dominant for the cycle of thirty years, are the bell-shaped skirt, of which the hoop skirt was typical, the back fullness or "bustle" skirt, and the tubular skirt. Within the cycle of each skirt type there is opportunity for endless variety from year to year, changes in length and width of the skirt, as well as changes in sleeves, necklines, and belts. The author concludes that the changes that have taken place in fashion have been "continuous, constant, and moderate—never extreme or abrupt," and always variants from the dominant cycle.

The illustrations from which the author draws her conclusions are themselves the result of years of research to find a typical dress for each of the 178 years she studied. The statistical method she developed has great significance for fashion designers and retailers of fashion merchandise. Mrs. Young has indicated the direction in which her findings may be used to study trends and forecast fashion acceptance, and it seems likely that students will elaborate on her method and apply it to the wealth of fashion material available. Further study of her conclusions may indicate that, within the broad sweep of the cycles she defines, other factors such as economic changes and cultural developments have had an important influence without in any sense changing the concept of major cycles.

A much more detailed study of the significance and co-ordination of "trend lines" within the major cycles will be necessary before the method indicated will take the guesswork out of fashion merchandising. The statistical method and the type of material used in her studies are simple enough to encourage their widespread use by students interested in fashion research and analysis. Such research may yet reduce the vagaries of fashion to something approaching exactness.

The present cycle of the tubular skirt has already, according to Mrs. Young's figures, run its allotted course. It may well be, as the author indicates, that the pattern she has charted will be broken just as it is discovered. Although skirts may not proceed in orderly sequence to an era of loops and crinolines, the importance of the discovery of fashion cycles will not be nullified. There will still be available a valuable contribution to the study of fashion and a method for measuring and evaluating fashion phenomena as they occur.

LILLIAN FREIDMAN

University of Pittsburgh

The Economics of Consumption, by Charles S. Wyand. New York: The Macmillan Company. 1937. xiii, 565 pp. $3.50.

Two quotations from the preface offer the premise and purpose of this volume: "Conventional economics posits the existence of demand and lets it go at that. When something goes wrong with this factor . . . attention [is] turned to an assiduous analysis of the production and exchange mechanism. . . . The present work attempts the organization of available materials and the formulation of a few tentative conclusions. . . . " It is this function of arranging and coordinating extensive information from myriad sources that offers the chief merit of this book, which should find its place as a text and reference volume in educational institutions.

The author experiences the usual initial difficulties in defining the consumer status and in relating it more significantly to economic theory; and displays a zeal on behalf of the welfare of the consumer, culminating in the prediction of an impending era in which the business profit motive may yield to a service motive, largely through the impetus of consumer awareness and belligerency. But, as a whole, the book earns the gratitude of the reader for the arduous and painstaking tracing of sources, assembly of materials, and the classifying of inferences and of relationships.

Possibly the topic most grievously neglected, and doubtless the most difficult of adequate analysis, is the field of consumer finance. A discussion of instalment sales is included in a chapter on "Commercial Manipulation of Choice," largely from the viewpoint of misuse and the high cost to the consumer; the larger field of credit and loans is insufficiently explored in its relation to consumer welfare and economic function.

The book is divided into four parts. The first is an introductory stage-setting. In the second part, entitled "The Consumer and His Function," the economic and psychological bases of consumer choice are delineated. In Part Three, "The Determinants of Choice," the author delves into biological, physical, anthropological, sociological, psychological, and economic aspects of the problem. Many of these chapters are fragmentary and involved; the summaries of economic factors, of commercial manipulation and of Government activities are most satisfactorily developed. In the final part, four chapters discuss "The Planes of Consumption," including standards and norms of living and the responsibility of the consumer for solution of the involved problems.

JOHN H. COVER

The University of Chicago

Economic Development of Germany under National Socialism, by Vaso Trivanovitch. New York: National Industrial Conference Board, Inc. N.I.C.B. Studies Number 236. June, 1937. xvii, 141 pp. $3.50.

We have here an extraordinarily valuable summary statement of the economic balance sheet of National Socialist Germany at the end of 1936.

There exists no better analysis of the developments on the economic front in Germany from 1929 to 1936 than is provided by this little book. Chapters cover the organization of labor and industry, the economic position of German labor, the position of industry, the balance of international payments, foreign trade and the standard of living, and public finance. There is an excellent foreword by Virgil Jordan, President of the National Industrial Conference Board, and a most succinct summary of the whole book which precedes the formal chapters. Almost every chapter is also summarized, so that, in addition to being very compact originally, the book enables the reader to get a statistical picture of Germany in two other degrees of concentration. Although statistical tables are included, they have been thoroughly "digested" in the text, so that there is a very readable account available besides the statistics themselves. The book is an outstanding example of the principle that it is possible for an author to write a comprehensive economic or statistical work without competing with *Anthony Adverse* or *Gone with the Wind* in volume.

The author first states the general philosophy and policy of the National Socialist government toward industry and labor. "The theory of National Socialism is that the only employer in Germany is the German state and that no private interest is sacred if it conflicts with the interest of the nation as a whole. What is or is not in the interest of the nation is determined by the government; that is, by the National-Socialist party. Neither the employers nor the workers can refuse to carry out an order of the state, no matter how contrary it may be to their individual interests." National Socialism does not permit collective bargaining. Employees cannot refuse to obey decisions of the employer, but they can appeal to the "labor trustee" who is a governmental official. The labor trustee can not only change a decision of the employer, but he can, under certain circumstances, even dismiss the employer from his position of head of his enterprise.

Mr. Trivanovitch shows that production has risen substantially above pre-depression levels and that unemployment has been practically eliminated. He finds, however, that there has been no increase in wage rates, no boom in commodity and security prices and, what is very significant, no large dividend disbursements. National income has notably increased, and there has been a large increase in consumption. Business revival the author believes to have been brought about by government expenditures on public works and rearmaments. The large increases in business activity and in employment have resulted in materially increased tax collections and in a sharp contraction in expenditures for unemployment relief. Consequently, Mr. Trivanovitch does not believe that the present burden of governmental indebtedness is of alarming size. He estimates the public debt of Germany on March, 31, 1937, as between 37 and 38 billion RM, which would be an increase of about 10 billion RM since Hitler came to power. He concludes, "the size of the total debt is not excessive for a country of Germany's economic power. Consolidation of the short-term debt is not likely to cause any

embarrassment for the government because of its political powers of control and persuasion."

CALVIN B. HOOVER

Duke University

The Economics of the Iron and Steel Industry, by Carroll R. Daugherty, Melvin G. de Chazeau, and Samuel S. Stratton. New York: McGraw-Hill Book Company, Inc. Publication of the Bureau of Business Research, University of Pittsburgh. (Monograph Number 6.) 1937. Volumes I and II, xxxiii, xx, 1188 pp. $12.00.

These massive volumes, containing the report of a special staff retained by the Bureau of Business Research of the University of Pittsburgh to study the operation of the iron and steel industry under its Code of Fair Competition, undoubtedly constitute the most comprehensive and painstaking economic analysis of this industry that has yet been published. Although this work cannot, in all honesty, be recommended as light reading for an idle week-end, the interested student will find the material carefully organized and well written, systematically outlined in the table of contents, and adequately indexed. Moreover, for the reader who is in a hurry, almost every section and chapter concludes with a brief summary, while the first of the two final chapters is devoted to a summary of the findings of the entire study.

The three authors are individually responsible for separate parts of the report: Dr. Daugherty for the wage and labor sections and for the recommendations on labor problems; Dr. de Chazeau for the study of distribution and trade and of pricing practices; Dr. Stratton for the chapters on production and on costs and earnings; and the two last-named jointly for recommendations on pricing problems. In spite of this division of labor among the authors, the report as a whole gives a detailed but coherent and unified picture of the economic organization of the industry and of its functioning under the code. The study, however, is by no means limited to the operations of the industry under the NRA. Based in part on trends in its development over the past decade or so, the descriptive and analytical material will undoubtedly be timely for many years to come. Changes in the steel industry rarely come overnight.

The authors, happily, were not content with mere description and analysis. Whether or not one may agree with their interpretations and conclusions—and this reviewer, at least, is unable to accept some of them—the authors of the report cannot be accused of having run away from a fight. The industry's "code of fair competition" is handled without gloves, e.g., "the Steel Code exemplifies industrial self-government in practically unfettered form. . . The checks imposed on that body were entirely inadequate to secure proper protection and control," and, further, "The fundamental theory that, in return for certain minimum wage and hour standards and

for the expectation that employment may be increased and that the bargaining position of labor may be improved, an industry may be permitted to determine its own 'fair trade practices,' to determine its own pricing mechanism, and to enforce its determinations with prohibitive fines collectible at law under contract is contrary to all experience and inconsistent with all democratic precepts."

The adoption of the Code did accomplish one of the main objectives of the NRA, the improvement of labor conditions by raising wages and shortening hours, albeit Dr. Daugherty concludes that the increases in wage rates "were more than offset" by higher prices and by "decreases in other elements of total costs per unit of product." With respect to the collective bargaining features of the Code, however, Dr. Daugherty says, "the Government labor boards, faced with weak unions and with obdurate, powerful anti-union employers standing on their constitutional rights, failed, in spite of notable attempts, to resolve the major issues of collective bargaining and union recognition."

But in the field of price control the administration of the Code reached heights of efficiency rarely attained in this imperfect world. Price cutting, which has always been regarded as a dishonorable act in this gentlemanly industry, rose almost to the proportions of a capital crime. Not only was the basing point system legalized and extended, but chiselers who dared to make price concessions not specifically approved in the Code were faced with punishment in the form of "liquidated damages of $10 per ton of product sold contrary to the price, terms, or conditions provided in the Code or promulgated by the Code Authority pursuant to its terms." Needless to say, with the Code Authority clothed with almost unlimited powers as lawmaker, policeman and judge, "Price stabilization, in so far as it may be attained through price control, was probably more adequately provided for in the Code than at any other time in the history of the steel industry."

The authors, it is unnecessary to add, find little to commend in the administration of the Steel Code under the NRA. Faced with an almost unlimited opportunity to "analyze and devise a solution" for the industry's problems, the Code Authority interpreted its function as "nothing more than the maintenance of price control, and it performed this function with little regard for the vested rights or economic interests of minority parties . . . In short, it is inaccurate to describe the Code Authority's activities as comprising the determination of fair trade practices . . . Rather it devised and promulgated, with the force of law, trade practices, fair or unfair, that would effectively block price competition in the sale of Code products at the ultimate place of delivery."

After all this, one would not be surprised to find the authors advocating, with the Federal Trade Commission, that "competition should be enforced" in the industry by uprooting such monopolistic practices as the basing-point system and enforcing an f.o.b. mill price quotation system. On the contrary they find that such "ineradicable economic factors" as the small

number of sellers in the industry, the large capital investment and consequent importance of overhead costs, the lack of mobility in sources of supply and the inelasticity of demand, all "preclude a simple competitive price for steel." Anything approaching pure competition, in their judgment, would be "incompatible with the economics of the industry," "destructive of the long-run interest of all parties concerned," "ruinous," and "undesirable," "economically unattainable in the steel industry." In short, "the tonnage steel industry represents a problem in monopoly . . . an economic structure inherently monopolistic" and one in which "a fair price for steel and the elimination of preventable social waste can be assured under private ownership only if some form of social control can be made effective."

Space and time prevent an adequate presentation or appraisal of the authors' arguments for the preservation of the basing-point system and the adoption of some form of "social control" instead of an attempt to enforce price competition in an industry which everyone knows has always been characterized by "oligopoly," "price leadership," "collusion" and other monopolistic departures from the rarely attainable goal of "pure competition." This reviewer, for one, remains unpersuaded that some other form of social control (for, after all, governmental enforcement of competition is a form of social control) would be more effective in promoting the interests of "all parties concerned," than an attempt to enforce price competition in the industry.

After all, what do we mean by "cut-throat competition," by "ruinous prices," by "destructive price-cutting?" Whose throat is cut? Who is ruined or destroyed by price competition? What happens when the worst happens, and a physically efficient enterprise goes through receivership? Ownership changes, some of the security holders lose money, a new set of managers comes on the scene; but the show goes on; the physical equipment remains intact and continues to employ labor in turning out the products that society needs. The competitive system of private enterprise is something less than a profit system; it is a profit *and loss* system and if we insist on mutualizing the losses we must also insist on mutualizing the profits. And the authors of this study envisage this possibility. "Social control," they say, "may take many forms—industrial self-government with public supervision and appeal to some important body, government competition, complete socialization of the industry, or merely the accumulation and publication of factual data adequate to appraise the social and economic effects of industrial policies."

These four alternatives, in the judgment of this reviewer, leave a good deal to be desired. Certainly one would be naive to suppose that the mere "publication of factual data" would bring socially beneficial results. Industrial self-government under public supervision would lead inevitably to government price- and wage-fixing, to regulation of the industry as a public utility. And to resort to government competition would mean merely that other means of social control—apart from the last resort of complete sociali-

zation—had proved ineffectual. And, after all, if enforced private competition would have such dire effects on all parties concerned, is it likely that government competition would be socially beneficial? But perhaps, to paraphrase Mark Twain, the trouble with competition is that we haven't tried it yet. And if we do we may find that a pricing system which appears to be incompatible with the economics of the steel industry is in reality only incompatible with the interests of the steel producers.

J. FREDERIC DEWHURST

The Twentieth Century Fund

Location Theory and the Shoe and Leather Industries, by Edgar M. Hoover, Jr. Cambridge, Massachusetts: Harvard University Press. 1937. Harvard Economic Studies, Volume LV. xvii, 323 pp. $3.50.

As the title indicates, this study treats the history and development of the American shoe and leather industries as well as various problems in these industries which bear on the principles governing the location of economic activity, especially of manufacturing establishments.

In the historical sections there are detailed accounts of the several economic, social, and geographic considerations which affected the location of the two industries from Colonial times to the present. In leather production, early factories were small and widespread, and their location was determined primarily by availability of hemlock or oak bark. Later, the use of bark extracts or inorganic materials resulted in the dominance of a new locational factor, access to hide supply. Factories became larger and tended to concentrate either around packing centers, where cattle and calf hides were plentiful, or along the Middle Atlantic coast, where imported goatskin and sheepskin were available. Nearness to materials has been paramount.

Shoe production, on the other hand, has been oriented to markets or to labor supply. Despite the westward shift of population during the first half of the nineteenth century, Massachusetts and the Middle Atlantic states retained leadership, mainly because of the possession of skilled labor and plentiful capital for merchandising. Just prior to the Civil War the immigration of skilled German workers facilitated the westward development of the industry. In 1860 the introduction of the McKay sewing machine reduced the requirements of labor skill, and the leasing of machinery favored small western producers by keeping down capital requirements. More recently, the importance of style changes in shoes, with the resulting emphasis on speed of delivery and close contact between production and merchandising, has favored location in a metropolitan area. Higher costs resulting from organization of labor have favored suburban location and, in the past few years, have stimulated shoe production in the South. The apparent similarity in the locational patterns of tanning and shoemaking, in the opinion of the author, is largely coincidental.

In the sections on locational theory, Professor Hoover builds upon the

theory of orientation of Alfred Weber. If the distribution of natural resources and markets is taken as given, the location of extractive industries is determined by transportation costs. With the location of these industries set, it is shown that transportation costs also define the location of manufacturing industries, which, according to the nature of the productive process or of market demand, are material-oriented, market-oriented, or simply scattered between markets and materials. With Weber's theory the author combines a theory of market areas or spatial competition. He then introduces the effects on locational theory of differences in cost of production, mainly labor-cost differentials, and of economics of concentration. Although the theory of location still remains far from complete, the author's analysis helps explain many phases of the problem. More of the assumptions need to be studied. What would follow, for example, if the distribution of materials, markets, and population was no longer assumed as given? Further study is needed of the effects of size and density of a population on the division of labor, the extent of external economics, and the development of related industries. In his final chapter the author discusses phases of the theory of location which, if analyzed, would throw light on problems of monopolistic competition and of public policy relating to location of industries and people.

GLENN E. MCLAUGHLIN

University of Pittsburgh

Problems in Labor Relations, A Case Book Presenting Some Major Issues in the Relations of Labor, Capital, and Government, by Herman Feldman. New York: The Macmillan Company. 1937. xxxix, 353 pp. $2.75.

The conviction underlying this book of approximately 400 cases in labor relations, combined into 70 major problems, is that "the problem method is peculiarly necessary in the teaching of labor relations. One of the troubles in this field is that too much is taught in terms of generalities of economic and and social principles . . .and that too little is considered with reference to the ways in which human nature expresses itself in actual situations." Although the book is designed in part for courses involving professional training for labor administration or graduate work in labor relations, the author states that "it has more particularly had in view introductory courses in labor problems conducted in accordance with the modern techniques being developed in progressive teaching." An underlying hypothesis seems to be the belief, expressed by Professor Elton Mayo and quoted by the author, that "labor problems involve human and social, rather than economic, problems."

Such a book necessarily has to be evaluated from the point of view of pedagogy in the field of labor problems rather than in terms of the standards or criteria to which reviewers—particularly those not certain that the economic aspects of the problems are inherently less weighty that the "human and social" ones—might subject other labor books. Disputation among teachers

as to whether the problem method, with its almost inevitable emphasis upon the firm's or industry's viewpoint, is superior to the more customary forms of instruction is inevitable. But such disputation will be conducive to wholesome soul-searching on the part of the disputants; and even those most skeptical about the efficacy of the case method in the labor field must acknowledge the skill with which the work under review has been done. Professor Feldman's cases, drawn for the most part from actual experience, are grouped together under five main headings: wage problems; hours, working conditions, and labor legislation; old age, insecurity, and unemployment; the personal environment of work; and group relations, unions, and labor law. The cases are intended to be provocative, and almost invariably they are. They cover a wide range, and the difficult task of suggesting to the student those aspects and implications of the problems that lie beyond the concrete situation presented to him has been accomplished, it seems to the reviewer, even more successfully than one could in fairness demand.

Teaching labor problems by the case method of course involves dangers. Confronted with a definite situation requiring administrative decision, the student is likely to consider the problem almost exclusively in terms of this situation, perhaps to get into the snap-judgment habit, and to be more or less oblivious to the need for analysis of the underlying legal, economic, and social determinants of the problem. Certainly greater responsibility rests upon the instructor than under the more traditional methods of teaching. As the author observes, however, the cases can—and indeed should—be supplemented by other materials and means of study. It is true that some of the cases "go better" than do others, for the reason that their subject matter is more susceptible to presentation in terms of concrete situations requiring entrepreneurial decision. In the wage section, the problems of wage incentives, administrative problems, time setting, and the like lend themselves to this method more easily than do the more theoretical issues. Problems of supervision, discipline, suggestions, and employee grievances can be handled more effectively by the case method than can, say, the economics of the shorter working week or the issue of wage rate maintenance during depressions. The section on group relations and unions, it should be said, brings out most adroitly some of the knotty issues connected with the question of what constitutes bargaining in good faith, the ascertaining of the workers' choice of representation, and the majority vs. the proportional rule. The book deserves a cordial reception.

ROYAL E. MONTGOMERY

Cornell University

Urban Workers on Relief, by Gladys L. Palmer and Katherine D. Wood. Washington, D.C.: Works Progress Administration, Division of Social Research. 1936. Part I, xxvii, 203 pp. Part II, xx, 301 pp.

These two monographs embody the findings of a survey of urban workers on relief in May, 1934. The time was well chosen, inasmuch as it fell between

the peak of unemployment and the peak of relief. The basic social and economic information about families on urban relief rolls was collected to answer certain specific questions for the Federal Emergency Relief Administration in order to determine the future direction of the policies of the Federal Government in providing relief. Presumably, this purpose has been served, and any review of the monographs would be concerned with, first, whether the findings as presented represent an accurate interpretation of data and, second, whether the data as presented will be of general use to social scientists.

The study was based upon a sample of the relief loads of 79 urban centers which were widely distributed geographically and which represent a wide variety of economic and industrial backgrounds of American industrial communities. It is unfortunate that in the presentation the authors have not gone into more detail as to the basis upon which the sample was made. It is necessary to rely upon their statement that the data "may be said to be reasonably representative."

A most significant finding of the study was the large per cent of families on relief in which there was no employable member. Although this is no new or startling fact, yet there is considerable value in bringing the subject home with an impressive array of statistical data. In presenting this situation, the authors do not seem to be as clear as they might in their definition of the so-called unemployable, which of necessity is a very vague term subject to considerable disagreement as to its precise meaning. A large number of unemployable individuals, then as well as now, are almost certainly permanently unemployed. To designate them as unemployables, however, would hardly seem to be sound terminology unless the term "unemployable" is so defined.

In the findings, considerable emphasis is placed upon the description of a typically unemployed person and the average unemployed woman on relief. These concepts, while they may be effective in attracting attention to the study, have practically no meaning in a scientific sense. In fact, the authors in their text elaborate on the fact that the relief rolls of the country are greatly conditioned by the variety of different local practices and policies. Consequently, the total relief roll is by no means a homogeneous universe from which to draw a sample.

In the main, the analysis of the data, which is relatively slight in proportion to the mass of tables and charts, is a very good one. For the most part it is purely descriptive and easily read and assimilated. There is a criticism to be made with regard to the various charts scattered throughout the text. Since most of them are designed to convey a visual impression rather than to give statistical information, they should contain references to those tables of data upon which they are based. The pictographs seem wholly out of place and add nothing to the value of the document.

The second volume presents the detailed information by individual cities and should supply localities with valuable data on their respective com-

munities. A certain caution must be noted, however, with regard to using the data for intercity comparison. In the first volume the authors point out the great variety of conditions, such as the local administrative policies and procedures, the variety of local organizations dispensing relief funds, and the existence of strikes in some of the communities, which would materially affect the local character of the relief load at a given time. Although the authors have felt that these factors are relatively unimportant in describing the urban relief population as a whole, they recognize that they have a significant bearing on the analysis of the unemployment relief problem of any particular city. Therefore, any community using the data in Volume II in comparing their community with other communities would have to supplement the information in the monograph with a great deal of additional background material.

Ralph Carr Fletcher

Bureau of Social Research
Federation of Social Agencies
of Pittsburgh and Allegheny County

Economic Backgrounds of the Relief Problem, by J. P. Watson. Publication of the Bureau of Business Research, University of Pittsburgh. (Monograph Number 5.) 1937. $2.00.

The suddenness with which relief for the unemployed burst upon the national scene in 1933, and the amazing magnitude of its operations since that time, have almost literally buried the research worker under a bewildering mass of social and economic data. And the end is not yet in sight—indeed, the avalanche gathers force with each new study and program. The analyst, harassed by insistent demands for results and keenly aware that today's conclusions may be contradicted by tomorrow's development, grimly hacks his way deeper into the maze.

Slowly, and somewhat haltingly, the results of these efforts have begun to appear, and they are welcome. For these scattered reports and exploratory analyses contain the facts that eventually will form a broad base of knowledge about relief and unemployment which is essential to sound planning of a comprehensive public assistance program.

Dr. Watson has done a service in bringing together in his monograph a wide variety of facts, estimates, and inferences concerning employment and unemployment in Pittsburgh and Allegheny County. For his facts he has drawn heavily on the Fifteenth Census of Population, the concurrent Census of Unemployment, the Census of Employable Workers in Urban and Rural Non-farm Areas, Pennsylvania, 1934, and the compilations of the Bureau of Business Research, University of Pittsburgh.

Depending largely upon materials drawn from these sources, Dr. Watson embarks on the ambitious investigation announced in the title of his monograph, and immediately he is in difficulties from which he extricates himself

only occasionally. The chief difficulty appears to be that of building a bridge from the data to the stated purpose of the investigation, i.e., "an exploration in the probability of need," that will stand up under the heavy traffic it is made to bear. Unfortunately, the data differ enough either as to time or definition to require repeated estimates, adjustments, and assumptions. Perhaps for this reason Dr. Watson appears to be undecided in his introduction as to the best line of approach; and the reader confronted in the first eight chapters with theory and fact that are put together but are never integrated.

In the ninth chapter entitled "Irregularity in Opportunity For Employment In The Pittsburgh District" Dr. Watson suddenly reached solid ground, and presents an extremely forceful and interesting analysis of the rate of growth of business activity based upon a well integrated body of information. Again in the last chapter, which discusses social policy towards relief, Dr. Watson shakes off the difficulties that beset much of the work and presents some shrewd observations.

In addition to the specific information, this study is valuable in that it reveals some of the difficulties that confront the analyst who makes an excursion into what is, in effect, a new field. Given descriptive data on employment and unemployment, how is the analyst to evaluate the "probability of need" in terms of the organization and operation of our economy? Logically, the first step would be to derive a rationale of analysis from the mature body of theory and fact on the subject. But when the social analyst turns to economic theory for a point of departure into the field of unemployment, he finds the cupboard is pathetically bare. The kind of unemployment that gives rise to the problem of relief is simply not in the books of the theoretical economists who have laid the groundwork of our approach to economic problems.

Apparently, Dr. Watson was fully aware of this lack, for in his first four chapters he attempts to set up guiding principles in terms of the central concept of need: "Need, as it concerns us here, means not enough goods and services *before* relief is provided. Of its total extent, there is no record." (Page 4.)

Now it is one thing to argue that unemployment statistics provide a rough measure of need in the sense of a faulty working of the productive and distributional processes, and it is an entirely different thing to argue that these statistics provide a measure of need in the sense of relief. Obviously, relief-need is directly related to unemployment-need, but as yet no one has been able to show the extent and conditions of this relationship.

Between these two concepts of need—non-participation in the productive-distributive process, and involuntary destitution—Dr. Watson wavers, but on the whole he seems to prefer the former. Among his statistics of unemployment the reader will find none of the unemployment relief series that do indicate, however inadequately, the magnitude of distress unemployment.

It seems clear from this work that a full account of the economic back-

grounds of the relief problem will require a thorough overhauling of our thinking about employment, unemployment, the labor supply, and the labor market. By demonstrating the inadequacy of our present concepts, Dr. Watson's book is a step in this direction, and it should be evaluated in those terms.

John N. Webb

Works Progress Administration

Die Grossstädte im Strome der Binnenwanderung, Wirtschafts- und bevölkerungswissenshaftliche Untersuchungen über Wanderung und Mobilität in deutschen Städten, by Rudolf Heberle and Fritz Meyer. Leipzig: S. Hirzel. 1937. xi, 206 pp.

This analysis of the official data from the police registration system in Germany is intended partly as a contribution to a systematic social economic theory of migration and partly as a contribution to the information necessary for the new social planning in Germany. The basic problem is to determine the relation of internal migration to and from large cities to (1) the business cycle and (2) the economic and social structure of the cities, and to a less extent to the structure of the areas from which these cities recruit their migrants. Part 1 is primarily a summary statement of available knowledge concerning internal migration with reference to urbanization and an interpretation of the findings of this study. Part 2 is a detailed analysis of the reports of the German police registration system.

In the main, the analysis utilizes the total volume of migration, i.e., the sum of the migrations to and from an area during a specified period of time. For most purposes the total volume of migrations is a better measure than the more commonly used figures showing net gain or loss.

The subjects investigated include (1) the relation of the total volume of migration to the net result of those migrations and the relations of both to changes in business conditions and industrial organization; (2) the relation of the rate of mobility to the economic and social structure of the city, which is the focus of the migrations and of the areas from which the migrants come; (3) the rates of mobility for cities representing different types of industrial organization and various stages of the growth cycle; (4) the degree to which the mobility of the several occupational groups reacts to changes in business conditions; (5) seasonal fluctuations in the volume of migrations; and age, sex, and marital status of migrants.

Only a few of the major findings can be mentioned here. The total volume of migration in the postwar years is considerably less than in the prewar years. The volume of migration from cities generally increases in periods of prosperity and decreases in periods of depression. Losses by migration are primarily due to a greater decrease in in-migration than in out-migration, although an increase in out-migration relative to in-migration may sometimes be responsible for a net loss by migration. With increasing maturity

of the industrial organization and with increasing urbanization the proportion of intercity movements increases in relation to that of rural-urban migrations. The former show less marked seasonal fluctuations than do the latter. The several occupational groups have varying mobility rates, and the mobility of the unskilled group reacts most directly to fluctuations in the business cycle. The extremely large mobility rates for some unskilled groups are due to repeated migrations of the same individuals during specified periods of time. The relationship of rural-urban migration to fertility rates is complex—it is certain that the cessation of rural-urban migration would not necessarily lead to an increase in the birth rate of the total population.

The limitations of this study are largely inherent in the nature of the data used. The emphasis is primarily on acts of migration rather than on migrants. The available data for in- and out-migrations do not permit a ready count of the total unduplicated number of individuals involved. A large proportion of the migrants to a city remain there only a short time, as is shown clearly in the section of this study dealing with seasonal migration. The large amount of duplication involved when figures for in- and out-migrants are combined is a factor of some importance in describing the individual characteristics of migrants, such as age. For the major portion of the study, however, this distinction is of less importance.

The authors do not claim to have written a comprehensive treatise on internal migration. For instance, there is no analysis of the relation between internal migration and the optimum location of population with reference to economic opportunity, and non-economic factors in migration are scarcely mentioned. This limitation may also be responsible for the failure to analyze the relationship between urban rates of natural increase and migration. They do claim, with justice, to have made an exhaustive use of the available data for the aspects of the subject considered. Careful technical treatment has been combined with well-developed theoretical analysis and clarity of presentation. This book is certain to occupy a leading position in the rapidly growing literature on internal migration.

CONRAD TAEUBER

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Studies in Current Tax Problems, under the direction of Carl Shoup. New York: Prepared in Connection with a Survey of Taxation in the United States under the Direction of The Twentieth Century Fund. 1937. xxiii, 303 pp. $3.50.

The present volume supplements an earlier study of the Twentieth Century Fund, also under the direction of Carl Shoup, and supplies some of the preliminary data and methods of analysis that were employed by members of the research staff. The studies include estimates of the Federal, state, and local taxes paid by different income classes in New York and

Illinois, a comparison of the aggregate burden of Federal and state income taxes in eleven states, a compilation of state property tax rates, a study of the costs of administering various state and local taxes, the methods followed in estimating the yield of income and estate taxes, an estimate of Federal, state, and local expenditures for the period 1936–40, and a list of recent studies of state and local tax systems.

The field of taxation is largely a dark continent with vast unexplored areas. Studies such as these shed much needed light on subjects where information has been lacking because of inadequate statistics and the unavailability of statistical techniques by which the far-reaching and intangible results of taxation may be determined more accurately and solutions for difficult problems in tax administration and tax policy may be found. The present volume is welcomed as an application of statistical analysis to the problems of taxation. Much more work remains to be done in this direction, but the volume marks progress along a desirable trend. There are, no doubt, differences of opinion concerning the proper techniques of statistical analysis and their importance in the field of taxation, but it is significant that taxation is being studied with the aid of statistical devices which enable research workers to formulate conclusions more accurately in many instances.

To many readers the most interesting part of the book will be the first section, comprising a study by Mabel Newcomer, in which estimates are made of the taxes paid by different income classes in New York and Illinois on the basis of various assumptions concerning the shifting of Federal, state, and local taxes. The estimates are admittedly rough and apply to certain family types rather than to particular families. The data support the conclusions that property and commodity taxes are regressive in their burdens, that the progressive element in American taxation results from the collection of progressive income and death taxes, and that the tax burden among the income groups is, "on the whole, progressive." It is concluded that the taxation of the population not subject to income and death taxation, however, is regressive in burden, whereas the taxation of the classes paying income and death taxes is progressive in burden.

The study illustrates the difficulties arising when an effort is made to measure individual and class tax burdens as long as so little is known about the incidence of taxes. On the basis of particular assumptions certain conclusions may be drawn, but in many cases it is not known which assumptions best fit the facts of tax shifting. The authors of the two tax studies of the Twentieth Century Fund have not essayed the difficult task of showing precisely how taxation should progress in its burdens so that the maximum justice may be attained but have recommended a number of significant reforms. Ability to pay is still an indefinite standard of tax justice, but eventually it may be possible to formulate and apply this principle more satisfactorily.

The volume gives much information that will be useful in the interpreta-

tion of the conclusions reached in the earlier report and in the development of techniques of statistical analysis of the incidence and effects of taxation, the costs of tax administration, and other problems. Although many perplexing questions concerning taxation must remain unanswered for the present, at least, it is encouraging to have available the results of competent research in taxation of a number of tax authorities.

ALFRED G. BUEHLER

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International Short-Term Capital Movements, by Charles Poor Kindleberger. New York: Columbia University Press. 1937. xi, 262 pp. $3.00.

The scope of this book is considerably broader than its title suggests. Dr. Kindleberger has sought to provide a theoretical analysis of the structure of international monetary relationships better adapted than the oversimplified doctrines contained in older treatises to penetrating the extraordinary complexity of current developments and problems in this field. His interest lies not so much in building up a case for or against any particular kind of monetary standard or policy as in setting forth the relationships between the national money income, the balance of payments, and the rate of exchange.

The study is divided into four parts, of which the first deals with the effects of international movements of short-term funds upon the money supply and the national income, pointing out in detail how such movements may take the place of gold flows not only in balancing the balance of payments but also in their effects on national money income. In part two the transfer mechanism is described under assumptions of both fixed and flexible exchanges. It is shown that when exchange rates are fixed, adjustment takes place through the effects of movements in national money income on the demand for foreign trade goods and that the degree to which changes in money income are called for by the adjustment process is dependent upon what Dr. Kindleberger terms the flexibility (i.e., income elasticity) of demand for foreign trade goods. Under a system where fluctuations in exchange rates take the place of transfers of gold and short-term funds, adjustment comes about more largely through the effect of exchange rate movements upon the relative prices of domestic goods and foreign trade goods, thus producing the needed changes in real income without necessitating changes in money income. Part three of Dr. Kindleberger's study deals with several topics which are only loosely connected, of which the chapter on foreign exchange equilibrium is probably of greatest interest. In this chapter he shows that the equilibrium rate of exchange is determined by two groups of factors: the monetary factors as reflected in the relative level of incomes and prices, and the real factors as reflected in the substantive course of trade and capital between countries. The exchange rate is in equilibrium, at least momentarily, when the balance of payments is tending neither to increase

nor to decrease the national money income, and this will be the case if such gold flows as are occurring merely offset movements of short-term capital. In part four the author applies the analytical apparatus developed in the earlier sections of his book to the problem of internal stability in an open economy and for such an economy suggests that changes in money incomes in other countries or in the substantive course of trade and capital are bound to have domestic repercussions, though the form and extent of these repercussions are dependent in part upon the type of currency standard and monetary policy in effect. A chapter is devoted to a discussion of the forward exchange market and another to stabilization fund operations. Some useful suggestions regarding the use and interpretation of the capital movement statistics published by the United States Treasury Department are contained in an appendix.

Dr. Kindleberger's treatment of the role of short-term capital movements, the transfer mechanism, and foreign exchange equilibrium represents a further extension of the theoretical approach to these problems developed by such writers as Angell, Ohlin, and Iversen. In the reviewer's judgment, this approach provides a much more accurate account of observed phenomena than the price-specie-flow analysis, with its tendency to minimize the significance of short-term capital transfers and of shifts in demand schedules as elements in the adjustment process and its dependence upon a particularly rigid version of the quantity theory of money. One of the chief merits of Dr. Kindleberger's book is that he does not succumb to the temptation to overstate his points as a means of emphasizing the contrast to earlier theories, as some other writers have done. Thus, he is careful to point out that not all movements of short-term funds are of the equalizing variety and to discuss the effects of other types of movements. He shows also that the relative effectiveness of short-term capital movements and gold movements in producing changes in national income depends partly on the laws, traditions, and policies governing the banking system and partly upon the whole economic environment. Finally, while stressing the importance of shifts in demand as part of the transfer process, he avoids the pitfall of holding that these shifts necessarily obviate the need for changes in terms of trade.

The theoretical structure set forth by Dr. Kindleberger rests in some measure upon a rather sharp conceptual distinction between short-term and long-term capital movements of a sort which it is exceedingly difficult to draw in practice. As he indicates, what matters for some purposes is not so much the type of asset involved but rather the transitoriness or permanence of the influences giving rise to the movement. Thus, for example, substantive factors may produce sustained, one-directional movements of capital which are short term in form, while transitory influences susceptible of possible early reversal may generate movements of apparently long-term capital. In the light of this consideration, Dr. Kindleberger's proposition that the existence of exchange rate equilibrium is revealed in the balance

of payments by an equality between gold flows and short-term capital movements loses much of its apparent simplicity and precision. Moreover, the proposition that when such equality exists, the balance of payments tends neither to increase nor to decrease the national money income implies a categorical distinction between long-term and short-term capital movements so far as their primary effects on money income are concerned, although the author elsewhere points out that the actual range of possibilities in this respect is extremely wide and that from this standpoint no hard and fast line can be drawn between these two types of movement. This criticism is not designed to minimize the importance of Dr. Kindleberger's theoretical contribution, which, indeed, is substantial, but rather to suggest the difficulties which beset any attempt to give precision to concepts which are, perhaps, inherently nebulous.

EMILE DESPRES

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The Undistributed Profits Tax, by M. Slade Kendrick. Washington, D.C.: The Brookings Institution, 1937. Pamphlet No. 20. 108 pp. 50 cents.

Analysis of replies from 1,560 industrial corporations to a questionnaire on the undistributed profits tax is the primary concern of this pamphlet. The imposition of the undistributed profits tax has introduced an economic controversy that demands prompt action, and Senator Steiwer (who sent out the questionnaires), the Brookings Institution, and the author are to be congratulated on undertaking to gather and analyze these factual data in a field where opinion has been supported largely by abstract reasoning and isolated cases.

The questionnaire deals with (1) the corporations' reasons for accumulating reserves, (2) the extent to which their reserve and dividend policy has been modified by the tax, (3) desirable amendments to the present tax law, and (4) the opinion of corporation officials as to the consistency of the tax with sound business policy.

The reasons given for accumulating reserves (among which provision for lean years and for expansion rank first) emphasize the desirability of substantial reserves. Of more interest, however, are the effects of the tax on reserve and dividend policy in the first year of its operation. The tax stimulated the majority of the corporations (572 out of 684) to distribute a larger proportion of earnings than they would have distributed in the absence of such a tax. This was, of course, one of the objectives of the tax. It did not, however, influence the kind of dividends paid in most instances, nor did it change policies with regard to repayment of company obligations or reduction of the amount of capital deficits in the majority of cases. These are answers to some of the most urgent questions that those concerned with the desirability of the undistributed profits tax have been asking.

The answers to the questionnaire offer little light on the possibility of ob-

taining new capital by other means than the accumulation of surplus, although some of the comments of corporation officials on this problem are given, and the author has included in the study pertinent data from other sources, notably the Securities and Exchange Commission.

An important addition to the tabulation of the direct replies to the questions is the reproduction of well-chosen excerpts from the comments of different corporation officials concerning specific problems that their corporations have faced in consequence of the new tax. The net effect is to make a very forceful case for the repeal of the tax, from the business point of view; and it is not surprising to find that only 13 corporation officials out of 1,245 believe that the tax is consistent with sound business policies. Although certain amendments to the tax are strongly urged, it is apparent that this body of officials believes that the only real solution of their difficulties is repeal.

In this opinion Mr. Kendrick concurs. After considering and condemning the tax from the viewpoint of "economic justice" he states: "the conclusion reached is unequivocally that the tax should be repealed." The nature of the study is such as to preclude a balanced presentation of the advantages and disadvantages of the tax, but this in no way impairs its value as a document presenting both the business man's attitude toward the tax and the way in which the corporations have met the problem in its initial year.

MABEL NEWCOMER

Vassar College

Studies in Massachusetts Town Finance, by Eugene E. Oakes. Cambridge, Massachusetts: Harvard University Press. Harvard Economic Studies, Volume LVII. 1937. 237 pp. $2.50.

This book is not a statistical study. For that reason it probably will not be read by many statisticians. Yet so much their loss, for the author has used an approach, the intensive case method, which some statisticians might well examine if only to foster an increased objectivity toward their own methodology.

Nine detailed studies in local finance and community economic history occupy the entire book, save for a brief introduction and a conclusion. The material abounds in figures, presented in tabular form; yet it is readable. The text shows the hand of a careful worker and of one who has mastered his tools and subject matter.

One may appreciate the merits of the case method and of this excellent application without, however, giving unqualified praise. The author voices a strong belief in the need for intensive case studies in public finance. Moreover, he has demonstrated skillfully that this approach will yield fruitful results. Yet this book probably will not go far toward encouraging others to go and do likewise. The reasons are not very obvious but they are there. The study has not been labeled as one in methodology. More basic, the introduction, or an appendix, might have been devoted to describing the whole

approach. A critical appraisal of source material, a record of successful steps and any blunderings and of the "hows and whys" would have encouraged others to explore the possibility of applying the same method to other phases of public finance.

Again, the author should have made more of an attempt to relate his results to problems which are common to local finance the country over. He knows the field and could have written with much broader pen-strokes. Such would have met the criticism that the case method unduly narrows the investigator's horizon. Unfortunately the introduction and the conclusion are too brief and inadequate for attaching to the results their full significance. An attempt in the right direction is made by linking these case studies with the broad problem of benefits versus tax burdens. But either the central theme is too general, or not sufficiently emphasized, or else the factual situations are not adequately integrated with this main theoretical consideration. It is difficult to decide which.

An important by-product of these nine cases is the concrete evidence which they offer as to how the changing character of a community's economic life affects the finances of the local government. Nor can one overlook the amount of useful, historical light which these case histories throw upon such current problems as the movement toward consolidation of local units, state-administered locally shared taxes, the effect of poor relief upon local finance, and the varying character of the poor relief problem in different types of communities. To mention only these ought to be sufficient to show that the contents of this book, as well as the method, are of more general significance than the title would suggest.

A. M. HILLHOUSE

Municipal Finance Officers' Association

Federal Subsidies to the Provincial Governments in Canada, by James A. Maxwell. Cambridge: Harvard University Press. 1937. Harvard Economic Studies, Volume LVI. xi, 284 pp. $3.00.

In this interesting and valuable book Mr. Maxwell traces the history and judges the experience of Provincial subsidies in the Canadian federal system. Beginning with an examination of the politico-financial problems that beset the conventions and conferences in which the constitution of 1867 was hammered out, he describes the financial arrangements agreed upon and written into the British North America Act as "full settlement of all future demands." It is clear that the framers of the constitution believed that they had settled the question for all time. The next 175 pages show how even before the new constitution came into operation the demand for "better terms" was in full cry; how during the past 70 years the pressure for increased subsidies has never ceased; how a dozen separate and specific changes have been made, most of them in turn labelled "a final and unalterable settlement" of the subsidy question; and how the problem of subsidies and "better terms"

is as politically ubiquitous today as ever. The perennial demand has come with equal force from east and west, from the distressed areas of the Maritimes and the extravagantly optimistic prairies and Pacific Coast.

Mr. Maxwell's general conclusion is that Canadian experience amply justifies the orthodox view that unconditional subsidies are a bad thing, that the responsibilities of taxing and spending ought not to be separated, and that unconditional subsidies almost inevitably become inextricably involved with questions of party management and election manoeuvring. Mr. Maxwell recommends that the present subsidies be capitalized at a generously low rate and that the federal government take over provincial debts equal to these capitalized amounts, thus solving two problems at once—the "canker of subsidies" and the burden of provincial debts.

Some of the implications of this suggestion are not fully considered. Such a transfer of indebtedness would virtually extinguish the entire provincial debts of two provinces and would reduce the debts of most of the other provinces to levels which might invite such future borrowing as to produce just as serious a debt position 20 or 30 years hence. To forestall this by imposing rigid federal or collective control of provincial borrowing might be politically as difficult a problem a subsidies. The special position of Prince Edward Island is passed over too easily. In this case the capitalized subsidy is nearly five times the total provincial bonded indebtedness, and three times the total bonded indebtedness of the province and all its municipalities combined. Australian experience suggests that debt transfers will do nothing toward silencing the incessant demands of psychologically or economically depressed areas for new or larger subsidies. It is to be feared that Mr. Maxwell's proposal would be no more a final and unalterable settlement than any of the dozen others that have gone before. As part of a broad and comprehensive scheme of reallocating functions and taxing powers between Dominion and Provinces the suggestion has undoubted merits.

In a brief Part II of 50 pages, Canadian experience with conditional subsidies and grants-in-aid is examined. These devices have been tried in only a few cases. In the earlier experiments the schemes were vaguely conceived, ineffectively supervised, and probably did more harm than good. More recent attempts to use this device have been moderately successful, and we may expect its more extensive use in the future. The scope of the book does not include provincial-municipal grants-in-aid.

Broadly speaking, this book is more a study in politics than in economics. Little economic analysis is attempted; the problem of the relative incidence of the subsidy system compared with other means of meeting provincial financial needs is not examined; the rather highly regressive nature of the whole Canadian tax structure is not emphasized; the unwillingness of some of the provinces to use all the taxing powers they have receives little attention. It is often easier, and certainly more popular, for a provincial government to raid the federal treasury than to impose heavier taxation. For the benefit of the general reader, the problem of subsidies might with advantage

have been more adequately set against the broader background of the whole range of Dominion-Provincial relations. Mr. Maxwell has nevertheless given us a valuable survey of one important aspect of federal public finance. He has brought to this study not only an accurate knowledge of the history of these subsidies based on painstaking study of voluminous government reports and manuscript archives covering a period of 80 years but also a keen sense for and appreciation of the realities of Canadian politics. Notwithstanding its fullness of detail, the book is eminently readable. It is a notable contribution to the neglected field of Canadian public finance, a useful addition to the broader literature of federal politics and finance, and a most timely document for the consideration of the Royal Commission on Dominion-Provincial Relations which is now in the midst of its labours.

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Corporate Interest Payments 1921-1932, by Edward Douglass Burdick. Philadelphia: University of Pennsylvania. A thesis in economics presented to the faculty of the graduate school in partial fulfillment of the requirements for the degree of doctor of philosophy. 1936. 130 pp.

The author of this brief statistical investigation is at least making a beginning in the direction of testing the accuracy of the various theories of the business cycle that take much for granted in describing interest payments, interest rates, and the problems of debt in general. For the movement of interest payments he chooses the period 1921-32. In considering the cyclical aspect of the problem he takes the shorter period 1929-32 and also presents a comparison between 1921 and 1931. As Mr. Burdick candidly admits, there are many gaps in his material. Nevertheless, he feels that, on the basis of the evidence available, theorists have been taking much too much for granted in their broad generalizations in regard to interest payments. Students of theory might find it worth while to look over the statistical details of this study.

J. ELLWOOD AMOS

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